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ABSTRACT

This is the second in a series of reports concerned with evaluating the impacts of land development. This report discusses in considerable depth and detail how development affects the revenues and expenditures of local government. Questions include the following: (1) Will new development inflate the demand for public services and facilities in excess of the tax revenues it generates? (2) Are communities searching for new development and new sources of revenue to ease the tax burdens associated with existing developments that do not pay their own way? and (3) Are cities, suburbs, and suburban communities pitted against each other in obtaining additional tax dollars and excluding tax users? In this report a large number of fiscal studies were examined to determine why findings differ, to identify the major analytical issues, and to synthesize a judgment about the utility of fiscal impact analysis as a tool for better land-use planning and management. (Author/MLF)

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FISCAL IMPACTS OF LAND DEVELOPMENT

A Critique of Methods and Review of Issues

Thomas Muller

1975

EA 007 445

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FOREWORD

This is the second in a series of reports by The Urban Institute's Land Use Center concerned with evaluating the impacts of land development. The first report, *Measuring Impacts of Land Development: An Initial Approach*, suggested a wide range of social, economic, and environmental concerns which should routinely be assessed in the course of deciding among alternative land uses. It also described various procedures for actually making impact measurements which might be used by local governments to achieve a better understanding of land use consequences both before and after a developer's plans are given the go ahead.

This report discusses in much greater depth and detail one of the most hotly debated questions of impact measurement: how development affects the revenues and expenditures of local government. Will new development inflate the demand for public services and facilities in excess of the tax revenues it generates? Are the nation's communities on an unending quest for new development and new sources of revenue to ease the tax burdens associated with developments already in place which do not pay their own way? Are cities and suburbs, and suburban communities themselves pitted against each other in obtaining additional tax dollars and excluding tax users?

For many years, it was assumed that almost any growth was good for the community and the local fisc. But, this perspective is rapidly changing. The growing volume of fiscal impact or cost-revenue studies alone, by both government and developers, attests to the fact that many communities are taking a second look. The impact of development on the fiscal health of local governments is now a widely recognized criterion for judging the acceptability of a land use proposal.

It is timely, therefore, to step back from the claims and counterclaims of developers, environmentalists, no-growth or slow-growth advocates, and others and take stock of the state of the art which underlies their bottomline calculations of fiscal impact. This report does that. A large number of fiscal studies were examined to determine why findings differ, to identify the major analytical issues, and to synthesize a judgment about the utility of fiscal impact analysis as a tool for better land use planning and management.

Of course, land development impacts extend far beyond the question of public revenues and expenditures. Subsequent reports will focus on private economic effects, the environment, and social concerns.

Sound public policy requires an ability to responsibly weigh the outcomes of different land uses in relation to community objectives which are frequently in conflict. Taken together, this series of reports should help contribute to that end.

WORTH BATEMAN, *Executive Director*
Land Use Center
The Urban Institute

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Worth Bateman, Executive Director of the Land Use Center and George E. Peterson, Philip S. Schaenman, and Grace Dawson, all of The Urban Institute, provided valuable insights and comments. Walter Rybeck edited the report and contributed substantially to its organization and content.—T.M.

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The Advisory Group provided guidance for the overall project of which this report is one part. This report, however, is the sole responsibility of the author.

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I. INTRODUCTION

OVERVIEW

The purpose of fiscal impact studies is to determine whether developments will generate enough new taxes to pay for the added public services they will require. This is not merely an accounting problem since future tax levels can affect public services and hence the character of the community. The growing interest in the use of fiscal analysis to evaluate the impact of land development projects on local government reflects the concern that some land uses may have adverse fiscal effects. During 1973 and early 1974, the volume of fiscal studies exceeded all such analyses identified in the previous five years (see Bibliography). Increasingly, communities are also undertaking studies of alternative future growth policies, and assessing fiscal effects as part of the evaluation of available policy options. In addition to local interest in this subject, some state governments, such as Florida and Vermont, have adopted land use or environmental legislation requiring that fiscal effects be considered for certain kinds of projects.

These expanding uses of fiscal studies make it advisable to take stock of the present state of the art in this field. How can local and other governments use fiscal studies to best advantage? What factors cause results to differ? How can local officials avoid confusion as contradictory impact findings are cited by groups proposing and opposing new development? Preliminary answers to these and other questions are offered in this report as it tries to present an objective perspective of the strengths and weaknesses of the many recent studies that have focused on the fiscal aspects of land use change.

Past attempts at estimating the revenues and expenditures associated with new development have concentrated on estimation and computational tools. The state of knowledge, therefore, is most advanced in this area. Less attention has been given to determination of the proper scope of an analysis. Which approach or combination of approaches is most appropriate for a given circumstance? Should economies or diseconomies of scale, for example, be incorporated into an analysis? These and other issues are discussed and guidance given to those sponsoring or reviewing work in the fiscal impact area. The attempt is to show the best of current practice while indicating some of the gaps or defects that require the special attention of analysts.

The emphasis of this report on fiscal impact is *not* intended to imply that these are more important than other types of impacts. Sometimes they may be; at other times they clearly should be accorded a low priority, for reasons discussed later in connection with the uses and misuses of fiscal analyses. Yet at no time can a community safely disregard entirely these fiscal impacts on the local treasury and thus on the local government's ability to provide services.

Detailed procedures are not specified because a number of previous studies, cited in this report, illustrate computation methods and data formats that may be followed. However, Appendix A outlines a general approach that may serve as a guide to those who are initiating fiscal impact analyses of individual developments.

PERSPECTIVES OF FISCAL STUDIES—AS RELATED TO SPONSORSHIP

The major objectives of those sponsoring studies vary according to their perspectives. Some want to win

support for proposed developments, others want to block or modify developments, and still others want to provide local decision makers with information on the economic effects of development, to create more knowledge about the intricacies of growth, or to aid in the formulation of new local, regional, and national growth policies.

The objectives of study sponsors determine, to a considerable extent, the scope and approach of analyses undertaken. Sponsors can be grouped into *private interests* (primarily representing *developers*), *antidevelopment* groups, *nonprofit organizations*, and the *public sector*, which may include local governments and regional as well as federal agencies.

Privately sponsored cost-revenue studies of proposed development are most often initiated to convince a public body to grant approval for a project. The results of such studies are presented to counteract the concern expressed by communities that the developments in question may cause an increase in the tax burdens of its present residents.

Those opposed to new development, for either environmental or other reasons, may sponsor studies to show that, in addition to other problems, a project is not fiscally beneficial. They tend to emphasize what economists refer to as "negative externalities"; that is, impacts of a development which will adversely affect residents outside its immediate boundaries, such as traffic congestion and overcrowding of public facilities.

Nonprofit organizations such as universities are primarily concerned with advancing the state of the art, improving methodologies to refine estimation procedures, and examining policy implications of findings.

The public sector has a somewhat different role. Bodies representing local governments at the regional level are particularly interested in fiscal flows among jurisdictions, economies or diseconomies of scale associated with consolidation of services regionally, the differential fiscal impact of growth among communities, and the most efficient location of new households within the region.

The federal government has two major objectives in sponsoring fiscal impact analysis studies: first, to provide information on the fiscal effects of certain federal programs, particularly in the areas of housing and economic development, and second, to develop general methodologies and guidelines for use by local governments which do not have the resources to sponsor this kind of research.

The overall interest of local jurisdictions is to determine the effect of new development on the welfare of their residents. Local governments, often through the planning or zoning boards, are frequently faced with the need to evaluate, in the context of broad economic, environmental, and social issues, the results of privately sponsored cost-revenue studies submitted to them. Because of their need to respond to specific proposals, local governments look to fiscal impact studies which develop general methodologies to aid them in the assessment of reports prepared by private groups. Communities may also carry out their own impact analyses of individual developments or sponsor studies aimed at estimating aggregate fiscal and other changes due to larger community growth patterns.

These uses of impact studies reflect the dual role of the local decision maker: to consider the short-term fiscal implications of individual developments, such as their impact on tax rates and on service demands, and to consider the long-term implications of growth as these relate to implicit or explicit goals of the community. The first role relates to existing legal constraints and institutional arrangements which require a specific response to each application for a land use change, with emphasis on the immediate impact of a decision on the community. This short-term perspective also reflects the view of those residents who are more concerned with the likely effect of a new development on the tax rate in the next year or two than with the long-term fiscal effects of a development on the community. Estimating the gross short-term effects may not require a comprehensive analysis. The second role involves an understanding of more complex issues, such as scale economies, the effects of constraining development on fiscal flows, and shifts in service preferences as a result of inmigration.

* * *

The *current* state of the art is discussed in Chapter 2. It reviews studies directly or indirectly linked to cost-revenue analysis and discusses methodologies applied to estimate fiscal effects. Chapter 3 notes factors which influence study results.

Chapter 4 presents a discussion that is more closely linked to the *frontiers* of the state of the art of fiscal impact analysis. It takes into account the long-term and broader fiscal effects of growth. Chapter 5 provides guidelines for implementing studies and notes current uses. Chapter 6 summarizes study findings and suggests areas for further research.

II. COST-REVENUE ANALYSIS – STATE OF THE ART

Cost-revenue or fiscal impact studies range in scope from analyses of individual developments which consider only revenues and operating outlays to studies which examine the fiscal effects of alternative growth policies in large urban areas. Taken narrowly, cost-revenue studies deal with computing the amount of revenue contributed directly by a new development, and the cost of providing services directly linked to the new development.

A few fiscal impact studies, usually sponsored by public agencies, also explicitly or implicitly incorporate one or more of the following considerations:

- Secondary effects, such as the impact of inmigration attracted by new industrial development.
- The likely economies or diseconomies of scale associated with increasing the number of units (households and business enterprises) serviced.
- Preferences of new residents for public services which may differ from those of the base population.
- Distributional fiscal effects.

STUDY CATEGORIES

The fiscal studies examined are of two broad types, those concerned specifically with the cost-revenue implications of proposed or expected development and those which examine the demand for public services as a function of population characteristics. The studies are also grouped into categories which reflect their geographic scope, starting with individual developments and leading up to regional growth patterns.

Individual Developments

The type of land use change acted on most frequently by local officials is the request for public approval of an individual development.

Many private studies related to such proposals, particularly those involving relatively small developments, have so narrow a focus and contribute so little to fiscal methodologies that they have been generally excluded from this survey.

In addition to private efforts, a number of studies sponsored by the Department of Housing and Urban Development and nonprofit organizations have been completed recently which are aimed at aiding local governments in the evaluation of predominantly residential developments.

Nonresidential developments are usually not the subject of privately sponsored impact analyses directed to local governments since, in terms of direct impact, they are likely to show a fiscal surplus and, thus, their fiscal effects are not a major concern to local government.[1]

Studies of large, planned, multi-use developments—particularly PUDs (Planned Unit Developments) and new communities—form the majority of individual development studies examined in this review. New communities and PUDs are of considerable interest to both

1. Among exceptions are the state of Florida, where large commercial and other developments defined as having regional impact have to file applications which specify their likely economic and environmental effect on the region. In addition, studies may be sponsored by developers in certain communities sensitive to new growth such as Montgomery County, Maryland, where opposition to nonresidential development focuses on environmental rather than economic concerns.

local governments and regional associations, since their potential population and economic activity frequently exceed that of the existing community and in any event are likely to result in significant fiscal changes. These studies have been sponsored by local and regional as well as federal agencies, most notably by HUD. In addition, developers have sponsored such studies.[2]

In some instances, comparative fiscal analyses of alternative development patterns on the same site are included. Specifically, differences between planned growth, sprawl development, or no development are considered in a number of cost-revenue studies.

Similar Developments in Several Locations

From a research perspective, the study of one large building or a few structures provides little insight into a more general fiscal pattern associated with a particular form of development. For example, a finding that one highrise apartment building or one industry produces a fiscal surplus may not be representative of other apartments or firms in the same community. A number of studies are now being undertaken which examine the fiscal impact of similar land uses in several locations. Both San Francisco, California and Arlington, Virginia have undertaken studies to examine the fiscal and other impacts of predominantly commercial highrise developments already completed in these communities [20, 21].* The fiscal impact of apartments and townhouses in a large number of New Jersey communities and the fiscal impact of new industrial facilities in a number of small Kentucky and Oklahoma communities have also been the subject of recent studies [15, 22].

Communitywide Growth Studies

The third major group of studies focuses on total communities and has as its primary objective estimating the collective fiscal impact of development on an area. Since the objectives of a community are more than economic, communitywide studies funded by local governments tend to incorporate environmental and other concerns. The fiscal parts of these studies are frequently aimed at responding to the question: Does growth collectively pay its way or do existing residents subsidize new residents? The general approach is comparative: the fiscal and nonfiscal implications of no growth, low-level growth rates, or high-level growth rates are examined in a number of studies as aids in formulating land use policies for the community. In addition, alternative patterns of growth (high and low population densities) are compared in some studies to determine how sensitive fiscal results are to these development patterns. In most cases, it is assumed that historical patterns will continue and that the socioeconomic and demographic characteristics of new residents will follow past trends. As a result, the effects of differences in characteristics of new residents on the fiscal balance are frequently not explicitly considered. This is one of the limitations of many communitywide studies reviewed.

Regional Studies

A small group of studies examine fiscal impact from a regional perspective. Their objective is to compare fiscal characteristics of communities within a region by size, density, and type of land use and identify causes for differences in revenue and expenditure patterns. In addition, fiscal flows among the communities may be computed and causes for household locational patterns identified [33]. However, these studies have not considered techniques to determine, from the public sector fiscal perspective, the most efficient location of new households within the region.[3]

Public Service Perspective

A number of studies examine the demand for local public services as a function of population and other community characteristics. Most of these studies are not directly aimed at evaluating new development and do not fit the geographic categories previously cited. However, since their objective is to determine how the demand for and the cost of public services varies as a function of community size, density, and location, they are directly relevant to the broader scope of fiscal impact analyses as defined in this report. Many of these studies appear in professional economic journals and related publications. They include econometric models for projecting the cost of public services and studies of the fiscal impact of annexation or consolidation.

DATA AND METHODOLOGIES

Various approaches are used to estimate costs and revenues associated with new development. Most fiscal studies of residential developments consider the impact of a projected number of housing units with site plans showing their location, configuration, and density. From

2. Studies of multi-use developments, particularly those sponsored by public agencies, frequently include nonfiscal considerations—such as the impact of large-scale projects on housing for various income groups, employment, and the physical environment. However, the focus of this study is on the fiscal parts of these projects.

* Numbers in brackets refer to studies cited in Bibliography.

3. The Urban Institute housing model appears to be a useful tool for examining the impact of new housing on the existing housing stock in a region. See: [64].

this and other information, the likely characteristics of *future households are estimated. These data, in turn,* are used to project the additional consumption of public services and the cost of providing these services. Another group of studies examines the cost of services for the same number of housing units given alternative physical patterns of development on a specific site. Comparatively little effort is taken in either group of studies to estimate future revenues. Frequently, only property taxes are computed directly, with estimates based on property values projected for the new development. Other revenue estimates are obtained by assuming that new residents will pay the same taxes, on a per capita basis, as present residents.

We will look first at the sources of data gathered for the studies and then at alternative methods of analyzing the data and applying the results. In addition to discussing techniques and their limitations, the more interesting study findings will also be noted; however, a comprehensive evaluation of results is beyond the scope of this paper. Although only one approach may be noted in a discussion of a specific study, the studies almost invariably use multiple means to gather and analyze relevant data. The methods discussed can be utilized in studies of new development as well as those which more generally examine public service demand.

Sources of Data

Data sources for fiscal impact studies include household surveys, local government agency records, and more aggregate data collected by local, state and federal agencies.

Household Surveys

One means of obtaining micro-level information about the usage of services, not simply generalized averages, but data that reveal variation according to the type of household or firm, is through direct surveys conducted by mail, telephone, or personal interview.

A sample of local residents drawn by the use of accepted statistical procedures is selected to represent the many factors which may explain differences in taxes paid and service consumption, such as income, housing type, and location within the community. An example of this approach was a mailed questionnaire used in Montgomery County, Maryland, as part of a study to determine the fiscal impact of various economic activities as a function of income, occupation and housing type [61]. The study shows little difference between types of housing in the frequency of service calls for police and fire protection. Yet, the data illustrate that, on a *per capita* basis, service usage is greater for apartment residents compared to the larger households residing in detached housing. A survey of households in Fairfax County, Virginia, was aimed at relating the consumption of educational services as a function of such factors as housing type, occupation, and education of household members and their length of residence in the county [81].

School children or their parents are frequently surveyed by local governments, as in Prince George's County, Maryland, to determine the number of students from various housing types, including detached housing units and apartments [27].

The major limitation of personal interviews is the high cost. Mailed questionnaires tend to have a low response rate and are frequently unrepresentative. The major advantage of personal interviews is less chance of misinterpreting questions. Telephone interviews often represent a satisfactory compromise between the insufficient response rate from mail surveys and the high cost of personal interviews. The resistence of some citizens to questions about their education, employment or income can limit household surveys [81].

An alternative approach to obtain individual household data on residents of new developments is to survey mortgage applications filed with financial institutions and rental applications filed with managers of rental units. This approach was applied to estimate the fiscal impact of a large PUD by obtaining data on income, age distribution and size of household for both owners and renters [13]. The advantages of this data source are the low cost and the reliability of information, particularly on income. However, most developers and financial institutions consider such data as confidential, limiting access to this information source.

Review of Detailed Agency Records

Data on service demand or tax payments on an individual household basis can be obtained by examining records maintained for specific service functions by most agencies of local governments. For example, future public safety expenditures in a partially completed new community were estimated using crime rates for already occupied units [9]. It was found that the frequency of crime in these initial developments approximated the community average. Similarly, the frequency of fire by housing types was obtained by tabulating the logs maintained at fire stations by address [27].[4] In a number of studies, property taxes paid by a particular building or group of housing units have been determined by ex-

4. Service costs may not vary in direct proportion to frequency of use. For example, the cost of *maintaining* a fire station may not vary significantly whether it handles a great many or very few service calls.

amining assessment records, such as are maintained by most communities. The advantage of this method is that the actual service consumption level for a geographic area or type of housing unit can be obtained without the necessity of involving the recipients directly. The major drawback is that it is sometimes difficult to obtain access to data, especially records which are not in the public domain.

Aggregate Data from Local, State, and Federal Agencies

Some communities aggregate detailed records of services, with data on the level and the unit cost of services, and make them available to residents as part of annual budgets or other reports. The Richmond, Virginia annual budget, for example, shows the unit cost of providing almost all local services, such as the average cost of responding to fire alarms, conducting electrical inspections of buildings, and investigating major crimes for the current year, with cost estimates provided for future years. Other communities issue annual reports for various departments which show the level of services provided to residential housing, commercial, and industrial facilities. The 1970 Census of Population and Housing is a frequently used source of information relevant to cost-revenue analysis. For example, the socioeconomic and demographic characteristics of inmigrants to a region and some communities can be identified. These data can be used to estimate the revenues from new residents and their likely demand for services such as education. The data which relate house value and rent payments to income in areas (census tracts) of new development are useful in estimating the income of future residents, if the market value of projected housing units is known. The Census of Governments issues data on assessed-to-market value ratios for property by type of land use every five years, which are needed to estimate property taxes. Data on public expenditures and revenues by function for all large cities by the Census, grouped by population size, are helpful in comparing changes in outlays and revenues as population increases.

These and similar aggregate data sources have several limitations. Unless the data are updated frequently, the information becomes obsolete. With the exception of data on school attendance, little information is provided on service consumption as a function of household characteristics.

Basic Methods

A number of techniques have been applied in cost-revenue studies which require minimal data gathering or analysis. These techniques have the advantage of low cost, but are frequently unreliable in predicting service demand.

Estimates by Local Officials

One recent study suggests estimating expenditures by asking those responsible for the provision of specific services what changes in demand they would project as a result of a specific development [2]. For example, the police chief and fire chief are asked what additional personnel and equipment they will require as a result of new development. A drawback of this approach is that estimates may reflect short-term estimates rather than long-term incremental expenditures. It is difficult to assess to what degree the level and quality of services to a community may change as a result of the projected manpower assignments. If a community has a tight budget, no personnel may be added as a result of the new development. Presumably, however, the distribution of existing personnel to provide services to new areas would have detrimental effects on older development.

This use of estimates by local officials and department heads to project future service costs has been shown to be extremely inaccurate in a retrospective analysis of the fiscal impact of a large development [10]. Estimated costs, even taking inflationary pressures into account, sharply underestimated the increase in the community budget.

The reliability of local agency estimates for a large area has also been examined as part of a study of the fiscal impact of annexation. Additional personnel were projected by responsible departments for all major city services prior to annexation. Several years following the annexation, these values were compared to the actual number of personnel added [72]. The data showed that, for some services, the estimates varied widely from the actual change. The additional number of personnel hired appeared to be strongly influenced by immediate budget considerations rather than by projected shifts in service demand.

Community Standards

Another rudimentary means of estimating expenditures likely to result from new developments is for a community to develop and apply service standards. For example, a number of communities have established per capita standards, such as a certain number of police and fire personnel per 1,000 population, specified acres of open space per 10,000 residents, a minimum number of library personnel and books per 1,000 residents, and so many hospital beds per 1,000 residents. A review of

standards for various services and suggested standards for a suburban community are noted in two recent growth studies [30, 36]. The number of employees per capita has been used to estimate public costs in other fiscal impact reports.

A major limitation of this approach as it is currently applied is its input orientation. Differential needs associated with the characteristics of new population are not taken into account. Since the use of community standards is essentially a per capita approach, it assumes that demand is not sensitive to the income levels and other socioeconomic characteristics of new residents, to revenue receipts, or to the addition of industrial and commercial property. Because of demand shifts caused by these factors, service quality projections may be distorted by applying per capita standards.

Share Allocation

A technique similar to the community standards approach is to allocate additional expenditures for the anticipated new population according to the present per capita cost of services in the community. This was one basis of allocating the cost of noneducational local functions for a PUD in New Jersey [10]. Since 45 percent of the population increase over a given time period was attributable to the PUD, 45 percent of the additional cost for services was assigned to the development.

The major drawbacks of this essentially per capita approach closely parallel those involved in the use of community standards: the approach does not distinguish differences between new and old residents, or between new residents living in various types of development. The share allocation technique has some virtues when it is used for comparative purposes, but it remains unsatisfactory as the basis for projecting the costs of new growth.

Accountant's Approach

In applying the "accountant's approach," annual budgets are examined for year-to-year expenditure changes by function that can be directly attributed to population growth. The major limitation of this approach is that accounting procedures are not aimed at specifying incremental costs. In most cases, at least some operating costs associated with new development are aggregated with service costs for existing residents in municipal budgets, so that development-related increases are difficult to identify.

In a cost-revenue analysis of new housing developments in San Diego, a comparison of the city's budget for two years was used in projecting fiscal impact [24]. This applied the accountant's approach, based on the premise that if servicing new residential growth requires additional city personnel or equipment, such additions would be spelled out in the budget. In the absence of such identified outlays, the increments in expenditures for the city are assumed not to be associated with growth. The use of this approach resulted in showing that the incremental cost of new housing is relatively small, since the San Diego budget did not directly identify all costs associated with new housing.

Methods Using Individual Household Data (Microlevel Analysis)

The individual household analysis approach emphasizes variations in the characteristics of the population, particularly between residents of new development and the balance of the population. Typically, the household size, age distribution, and income of new residents are estimated on the basis of projected housing characteristics such as number of bedrooms and cost per unit. The anticipated demand and consumption for public services, once household characteristics are projected, should be based on data obtained from surveys of recently completed developments. Service consumption, in turn, is readily translated into local expenditures. This form of analysis is applicable to studies of both individual developments and communities.

Demographic Patterns

A strong relationship exists between demographic characteristics of new residents and the type and size of housing units provided in a new development. The size of a household and the expected number of school-age children can be estimated using data provided on the type of housing unit and the number of bedrooms to be constructed. The relationship between the number of school children and type of housing (detached single-family, townhouse, garden apartment, highrise apartment) has been established in a number of studies. These efforts show the relationship between the number of bedrooms per dwelling unit and school-age children. However, as the subsequent discussion indicates, the development pattern can influence demographic patterns. It has also been shown that, in general, residents of new detached housing units have more school-age children than the community average. Since public education is usually the largest single local outlay, comprising 60 to 80 percent of local budgets in many suburban areas, the number of school-age children has a considerable impact on fiscal flows. Demographic data are also needed to project service demands for noneducational services.

Data for demographic analysis are frequently derived

from previous studies; in some cases, communitywide averages from the Census of Population or local sources have been used. However, for purposes of estimating the impact of new development, demographic characteristics need to be estimated from surveys of similar developments. Unfortunately, the use of values derived from other communities may be misleading. For example, a survey of Reston, a new community in Fairfax County, Virginia, shows 1.6 school children per detached housing unit, compared to less than 1.2 in the balance of Fairfax County for similar housing [9]. Another new community, Columbia, Maryland, has about 1.2 school-age children from each detached housing unit or more than 20 percent below Reston's average [66]. The demographic profile of PUDs (Planned Unit Developments) in New Jersey indicates an average household size of 4.1 with 1.9 children for single-family households [10]. The proportion of school-age children in new communities and PUDs tends to be higher than the proportion found in similar housing within conventional developments.

Most studies find that the number of school-age children in suburban housing is closely related to the number of bedrooms in each unit [27]. In the absence of other data, the bedroom count can be used as a crude proxy for household size.[5]

Data on the number of school-age children likely to attend elementary and secondary grades need to be adjusted to reflect non-public school attendance. Among the factors which influence private school enrollment are the perceived quality of the public school system and the religious affiliation of residents. Household income does not appear to be a significant variable in determining public school attendance in a suburban community [61].

Demographic analysis is also a useful tool in estimating the change in demand for noneducational public services since consumption of health care, libraries and recreation is concentrated among certain age groups. For example, a survey in Fairfax County, Virginia shows that over 80 percent of persons using selected recreational facilities are between the ages of 5 and 34 although this age group comprises less than 60 percent of the total population [68].

Changes in the demographic profile of residents as housing units in a neighborhood age also may prove significant, but such changes have not been identified in the studies reviewed.

5. Among exceptions are new residents of subsidized two-bedroom rental housing who tend to have the same number of school-age children as larger nonsubsidized detached housing units [27, 36]. Housing built to accommodate a particular group, such as singles and the elderly obviously do not follow this pattern.

Income Patterns

Since almost all major local revenues derived from households are income-elastic (rising or falling as incomes rise or fall), data on the income of new residents are critical in estimating taxes from new residential development [76].

The importance of income on the level of services provided to residents of a new development depends greatly on the ability of the income groups in question to influence allocation of services. For example, a new high-income development in a generally moderate-income community may demand and receive services exceeding the jurisdiction average. If residents of a new development represent a dominant proportion of a community's population, there is little doubt that their preferences for services will be reflected in the budgetary and allocation process because of their political clout.

Income analysis was one method used in a case study of Albermarle County, Virginia, where the demand for selected services was estimated based on the income anticipated for residents of the new development as compared with incomes of residents in the balance of the community [5]. For example, it was suggested that the demand for library service and recreation would be above the community per capita average, while the demand for health and welfare service would be below the average. Projections also took account of the tendency of affluent communities to demand higher-than-average public school services. The previously cited study in Montgomery County, Maryland incorporated survey data on the demand for public services as a function of income and housing type [61]. This study showed that demand for public tennis courts, golf courses, libraries, recreation centers, and public parking lots increased with rising income. For example, households with income under $8,000 used tennis courts, golf courses and libraries only half as frequently as those earning over $15,000. However, the use of police, fire, and health services was not related to household income. Cross-sectional studies also support the view that many public expenditure outlays are income-related [35].

A community's future aggregate expenditure levels are likely to be closely linked to revenues which can be anticipated. In estimating communitywide effects of growth, it is useful to compute the share of personal income which is collected by local government to pay for its services. If real income is projected to increase, the level or quality of services can be increased without changing the tax rate. If the same level of services is maintained, tax rates can be reduced.

The income level of inmigrating households is likely to be somewhat above the existing population average. As shown in a recent study, higher-income residents in both a central city and all its suburbs contribute substantially more revenue than they receive in services [33]. As a result, the ability to attract higher-income residents influences all future fiscal projections. Growth policies, in turn, influence the likely income level of future households.

Other Characteristics

Population characteristics other than age and income which affect service demand and consumption include educational level, previous place of residence, and ethnic background of inmigrants. For example, moderately sized communities, such as Palo Alto, California and Ann Arbor, Michigan have higher per pupil expenditures than communities of similar size and income where the average educational attainment of residents is lower.

It is likely that persons whose previous place of residence was a small town or farm will demand fewer public services than those who previously resided in metropolitan areas. There also appear to be regional differences in service demand which reflect, in part, the ethnic composition and cultural values of residents.

Information on such differences is limited, and it often may not be cost-effective for a community to incorporate these factors in their fiscal calculations.

Methods Using Aggregate Data (Macrolevel Analysis)

Aggregate or macro data analysis is most useful at the community or subcommunity level rather than in examining individual developments.

Cross-sectional Analysis

Cross-sectional analysis consists of comparing revenue and expenditure data for observations taken during the same time interval. In most studies, the basic observation elements are communitywide data. For example, expenditures for services in the same year are compared for communities, grouped by population size, to determine, by the use of regression analysis, if satistically significant relationships exist between their per capita outlays and their rate of growth. Expenditures by community size, holding rate of growth constant, are also compared. In order to effectively use cross-sectional analysis in a fiscal impact study, it is necessary to have a sufficiently large sample so that data on communities can be stratified by groups of communities with similar total populations and rates of growth. In addition, differences in income and land use should be considered.

An example of the use of this technique is a recently completed study by the Rutgers University Center for Urban Policy Research [54]. It uses regression analysis to examine expenditure patterns in New Jersey jurisdictions for all major local services between 1960 and 1970. Communities are grouped by their population size and rate of growth, and aggregate expenditure data are compared to determine how they vary among these groups. Since the study includes almost all municipalities in the state, both the methodology and the results are of interest. The authors state that previous research had shown that community growth usually resulted in a *lower* level of expenditures per capita when compared with expenditure levels of relatively stable communities.[6] However, this study finds that growing cities spend proportionately more per capita for municipal services than cities with more stable populations. The New Jersey study shows further that both cities gaining and losing in population have rising costs for public services, and that cities with declining populations have an even more rapid rise in the unit cost of public services than cities which are growing.[7]

New Jersey data were also used in a cross-sectional fiscal impact study of a new community [3]. In this study, communities in the state are ranked by annual growth rates and population size. Costs for specific services are then estimated as a function of population size. Cross-sectional analysis was also the technique used to project expenditures for public services in Michigan cities with a population of over 10,000 residents [1]. These studies, with far less clear-cut results, show that even when population size and density are held constant, considerable variations in per capita outlays for local services remain.

As part of a community growth study, a cross-sectional analysis of growing California cities examined the relationship between population size and community characteristics affecting local revenues and expenditures [41]. The data show that as the size of the city increases, assessed property values, sales tax receipts, and median income per capita all drop, while the per capita cost of public services, number of crimes per capita, and salaries for municipal workers rise.

Regional fiscal impact studies, which are concerned with differences in the distribution of characteristics of

6. Interestingly, an independent survey of the literature yielded the same conclusions as the New Jersey study [33].

7. This is not surprising, since large declining cities in New Jersey, such as Newark, have continuous outmigration of middle-income households and, thus, are left with a disproportionate share of low-income families. See also: [75].

the population, housing, and land use in a region as well as with intra-regional differences in expenditures and revenues, also utilize cross-sectional techniques.

A cross-sectional study was made of 226 communities in the Pennsylvania part of the Philadelphia SMSA (Standard Metropolitan Statistical Area), including 94 contiguous municipalities with a density of more than 500 persons per square mile and defined as suburban [35]. This study finds that, holding wealth constant, increases in density correlate positively with increases in local expenditures. No relationship was found between per capita income and expenditures for most public services, although this finding did not include the social services which are particularly sensitive to income. Industrial and commercial communities—those in which at least one-third of the property base is comprised of industrial and commercial property—have high police, fire, and general government outlays compared with predominantly residential communities. The study found that library outlays correlate positively with social rank, while general government and fire service outlays are lower where single-unit dwellings predominate. Police outlays were higher in areas of increased density and parks and recreation expenditures increased with the value of housing.

Time-Series Analysis

Time-series analysis involves the use of observations of a variable or set of variables at different points in time. For example, expenditure data for the same service in the same community can be compared for successive years. A major limitation of the time-series studies that were examined is that usually only one explanatory variable—population—was considered. Other changes in community characteristics during the time span, possibly crucial ones, were not captured. A statistical limitation of time-series data is that they are not "independent," since the dollar allocation for a particular service is closely related to the outlay level in the previous year.

Time-series techniques have been applied in a number of studies. The Fairfax County Five Year County-Wide Development Program [29] uses historical patterns to examine the impact of alternative population growth rates, making the assumption that population characteristics are independent of the growth rate. Utilizing time-series data, the study indicates that, as the general population and student population increase, public services such as education, health, and welfare show reduced average costs, while public safety and general government show increasing average costs. The equations applied to estimate incremental costs are, however, subject to criticism because potentially important factors have not been considered.[8]

Based on these findings, the Fairfax study concludes that expenditures per capita are not as sensitive to change in population as are revenues.

A similar time-series analysis technique is applied to estimate the incremental cost of additional students for a number of residential developments in California [8]. It is concluded, as in Fairfax County, that the incremental per pupil cost of education is substantially below average costs. However, a subsequent review of this study shows that the methodology applied is questionable, since it assumes that the marginal cost of an additional student did not increase during an eight-year period of rising expenditures [14].

A time-series study in Boulder, Colorado [25] for a period of 21 years (1950-1970) shows a rise in per capita outlays in real terms over this period. The study examines the rise in real personal income, and then estimates local expenditures as a percentage of personal income. Adjusted as a percent of income, little difference in aggregate expenditure is shown for the time period studied. General government costs decreased, while library, parks and recreation, and sewer outlays increased. The model projects rising per capita expenditures as a percent of per capita income for the 1972-1990 time period, assuming a growth in population from 67,000 in 1970 to 122,000 in 1990.

Econometric Models

Econometric analysis utilizes a mathematical formulation of economic theory and statistical procedures to measure theoretical relationships and to verify (or reject) given hypotheses. Econometric analysis applies techniques such as factor analysis and more advanced statistical methods. Therefore, to perform an econometric study, the analyst must have in-depth data on services and considerable skill in structuring models. Thus the applicability of this technique is limited to comparatively few jurisdictions.

A revenue/expenditure model applied to the City of New Haven, Connecticut, is an example of econometric analysis which takes a considerable number of variables into account, many simultaneously.[9] In addition to population, salary and service levels are incorporated into the model. Specific services are examined to

8. The methodology did not explicitly incorporate inflation rates and salaries which were increasing at the time student enrollment showed only modest increases. In addition, lags in adjusting for changes in enrollment due to institutional rigidity and contractual obligations were not considered.

9. See: [82]. This book provides data on the resources and computer costs associated with using the model.

determine what proxies can be used for service demand, and to what degree changes in the supply of services account for changes in outlay over time. Included in the analysis are property assessment and other submodels, and an analysis of demand for police and fire services as a function of neighborhood characteristics.

As examples of the results obtained, the study finds a high incidence of fires in areas which have crowded dwelling units of poor quality, and a low incidence in areas which have a high percentage of owner-occupied units. Police manpower is shown to increase with the rise in the crime index. However, the relationship between changes in expenditures and changes in the demand for and supply of services does not follow a consistent pattern. The study projects city expenditures based on alternative policy assumptions regarding service levels.

Fiscal Flow Analysis

Fiscal flow analysis is a means of comparing aggregate public sector costs and revenues among spatial areas or population groups. A positive fiscal flow denotes an excess of revenues over expenditures, with the excess flowing, in the case of spatial analysis, to a different subcommunity area or jurisdiction, and, in the case of households, from one income group to another. Fiscal flow data by intrajurisdictional area, land use, and income provide a framework for examining the impact of both individual developments and aggregate development. However, this technique requires a more substantial cross-sectional data base of revenues and expenditures than many communities have.

In a study of Prince George's County, Maryland [27], fiscal flows are estimated by type of housing unit and intrajurisdictional district. The county was divided into districts which were selected on the basis of population growth rates, population density, and income. Revenues for each district were computed from assessment records and income characteristics; costs for services, such as education, police, fire, and welfare, were derived from county records. The study found that both single-family dwelling units and garden apartments, in the aggregate, produced a deficit. As to fiscal flows, there was a drain from districts having moderate-income housing into both lower-income and above-average-income areas.

A similar fiscal flow approach was used in a study in Richmond, Virginia, which compared costs and revenues from the core central city with a newly annexed suburban area consisting primarily of relatively new residential developments [76]. This study showed that, on a per capita basis, capital outlays were higher in the annexed low-density suburban area, but operating costs for such functions as public safety and social services were lower. On balance, there was a positive fiscal flow from the suburban area to the central city.

Analysis of Physical Characteristics

The physical configuration of development, the mix of land uses, population density, and the natural environment are among factors which influence both public and private service costs. Studies which focus on this aspect are briefly noted, and limitations of this approach as applied in recent reports outlined.

Alternative Development Patterns

Local communities, counties and federal agencies have been among sponsors of studies to determine what pattern of development results in the lowest per capita cost of providing equivalent public services.

A comprehensive study published in 1955 estimates the fiscal effects of additional residential growth in suburban communities considering service costs for two patterns of development in alternative locations [46]. The likely annual cost of major capital outlays to serve the same population—given low, medium, and high density development on a hypothetical site—is the subject of a detailed analysis published in 1957 [38]. These early studies are aimed at estimating the costs of growth patterns representative of residential developments prevalent in the 1950s.[10]

The emphasis from the mid-1960s to the early 1970s on Planned Unit Developments (PUDs) and new communities initiated a new group of studies. The first of these efforts identified, which simulates public costs of land development alternatives in a semirural area, was sponsored by Howard County, Maryland as part of their analysis of the new town of Columbia [37]. This report projects sewer, water, highway, park, and school costs and concludes that the per capita cost of serving the same population is reduced if population density is increased. The Howard County report anticipated costs of providing utilities and other services from engineering handbooks and similar sources. Other studies elsewhere utilize a similar approach.

One recent report estimates cost implications of providing major public services and certain private services (such as utilities and housing) given a number of hypothetical alternative development patterns at the neighborhood and community level. The study concludes that substantial savings can be achieved in public and private capital outlays as a result

10. For reviews of these and similar studies, see Kain [39].

of what is defined as "planned" higher density development. Most of the savings are attributed directly to increasing the number of housing units per acre. Data in this report partly represent simulated values and composite statistics from various sources and locations. The conclusions regarding differences in capital and operating costs are not tested empirically by a comparison of actual data obtained from planned communities or large PUDs.[11]

Neither this study nor the Howard County effort include estimates of the revenues likely to accrue to local governments, which would also vary with density, housing mix, and urban form, and which would therefore have a bearing on the fiscal impact of different housing patterns.

The implications for expenditures given alternative development patterns are also examined in a study of St. Charles Community, a projected new community in St. Charles County, Maryland [36]. Capital and operating outlays associated with a planned community and with the existing growth trend (sprawl) are compared. The study, which also incorporates the impact of socioeconomic characteristics on per capita expenditures for services, shows that the planned community will bring savings in capital outlays and school transportation costs.

The impacts of alternative density patterns on major public service costs are considered in a study of Santa Rosa, California [41]. It shows little difference in operating costs but projects lower capital outlays if higher density developments were to be encouraged.

Fiscal and other implications of alternative development densities are the subject of a report focusing on a semirural area of Connecticut [42] which estimates costs and revenues if higher density "planned" growth takes place compared to trend or sprawl development. Although the two growth patterns would result in differences in demographic and socioeconomic characteristics, such as income, the study assumes that the per capita costs for almost all services are indifferent to variations in population characteristics.

The approach taken in this group of studies has certain shortcomings, in addition to those noted previously, from a fiscal perspective:

- Most of the studies do not relate differences in population density to the consumption of services other than education.
- Differences in the long-term capital costs for high-density concentrated development and for scattered development which allows future filling of open space are considered in only one study.
- Distinctions between private costs, public services paid by user charges, and public costs are not explicitly stated.
- Shifts between private and public costs, as for recreation, transportation, and utilities, as density changes are usually not considered.
- Differences in private and public construction costs on a square foot basis have not been taken into account in some reports.[12]
- Maintenance costs (such as repairs to utility lines) are not accounted for.

Characteristics of Land

Capital outlays, and to a lesser degree operating costs, are influenced by the physical location of a proposed development.

For example, topographic characteristics determine the extent of grading necessary for private as well as public construction, while soil characteristics determine the foundation necessary to assure structural stability. The need for sewerage and water treatment facilities is a function of both density and land characteristics.

A large-scale effort was underway in 1975 to estimate costs of providing public facilities as a function of land characteristics.[13] Since the proportion of facility and service costs financed by the public and private sector vary considerably between and among states, the importance of this factor in fiscal impact analysis depends on the location of a proposed development.

LIMITATIONS OF ALTERNATIVE TECHNIQUES DISCUSSED

A major limitation of most techniques described in the previous sections, particularly those which estimate changing expenditure levels, is that attempts are rarely made to adjust for differences in the quality and scope of services.

It may be that higher per capita outlays in a growing community are indicative of changes in service scope or quality, rather than attributable to higher public employee wages or increased service consumption at-

11. The Real Estate Research Corporation is presently undertaking a study which is applying its findings to selected communities.

12. Kain [39] states that any public sector savings associated with higher density are likely to be more than offset by increased construction costs. Private construction outlays, showing differences in cost per square foot as density varies are shown in [43, 62]. Other data indicate higher construction cost for facilities sponsored by the public sector in areas of high density. For further discussion of population density as a factor in fiscal impact analysis, see Chapter 4 of this report.

13. This research, at the University of Florida, was under the direction of Harry Merritt.

tributed to new residents. In undertaking an examination of changes in the cost of public services, differences in outlays due to shifts in service scope and quality need to be distinguished from shifts due to growth.

Three approaches can be used to measure differences in the level of services over time: changes in input, changes in output, and changes in the quality of output as perceived by the recipients of the service.[14]

Input measures include changes in police per 1,000 residents, pupil-teacher ratios, or other personnel changes on a per capita or per household basis. For example, it could be argued that the higher ratio of police personnel in a growing community or a smaller pupil-teacher ratio represents an increase in the scope of services. This approach, however, does not provide insight into the relationship between personnel assigned and differences in the quality of service, since additional personnel may be required to maintain existing service levels rather than to expand or improve services.

Output measures include such variables as the proportion of crimes that are solved, number of fires under control within a certain time interval, average dollar damage per fire, attendance at parks per 1,000 residents or achievement scores in schools.

An additional and very useful measure of service quality, particularly from the perspective of elected officials, is the satisfaction of residents. These perceived service qualities, as reflected in user satisfaction, may not be consistent with changes in other output measures. For example, classroom size may have been reduced and test scores increased over a five-year period, but citizen satisfaction with schools could be lower than indicated in an earlier survey.

One growth study includes ratings of all major local services grouped by size and growth rate of communities [58]. On the basis of interview data, the study found that consumer satisfaction is highest in moderately growing communities ranging in population from 10,000 to 25,000. While educational services were ranked highest in small communities, no service was rated comparatively high in large communities. The study found no relationship between per capita expenditure and service ratings with the exception of libraries, where higher outlays did correlate positively with greater consumer satisfaction. These results show that in New Jersey, resident satisfaction appeared to be virtually independent of expenditure levels. Although per capita expenditures are higher in communities with more than 10,000 residents, the satisfaction with services does not parallel higher outlays.

Several studies—reviewed in a recent article [56] which surveyed resident satisfaction with police services—find that smaller police departments with lower per capita expenditures are considered to be better by residents than those in larger suburban or central city jurisdictions where the per capita outlays are greater. This finding is consistent with the New Jersey data which indicate that higher per capita outlays for police are not linked to greater service satisfaction.

A survey of service satisfaction among residents of the Washington, D.C. metropolitan area indicates a similar pattern: Fairfax County, Virginia, which spends substantially less per pupil compared to inner suburbs and the central city, ranks highest among area jurisdictions for school services.[15]

These results, while tentative, tend to support the premise that higher or lower expenditures for many services do not reflect perceived differences in quality from the viewpoint of the resident.[16] What is the explanation for this? In the case of police services, for example, more police personnel (and thus higher spending) per capita are likely to be in response to higher crime rates rather than to demands for improved services that would bring greater public satisfaction. In contrast, higher outlays for libraries or parks tend to reflect service improvements if wages remain constant. It should be noted, however, that the surveys cited do not reflect the views of residents *over time*. It may be that as taxes increase, consumers anticipate more in services. The low service ratings in cities may also be expression of the general frustrations of residing in large urban centers rather than specific dissatisfaction with particular public services. Therefore, surveys need to be combined with quantitative output measures to estimate actual changes in service scope as well as perceptions of changes in quality.

Other limitations of the methods reviewed are that cumulative, scale, secondary, and distributional impacts usually are not incorporated in the analysis. In view of the complexity of these issues, the considerable resources required to consider these effects and the relatively short history of fiscal impact studies, one should not be overly critical of these limitations. (These issues are discussed in Chapter 4.)

14. A list of measures to meet specified objectives and data collection procedures for each measure for major public services can be found in a recent Urban Institute publication [86].

15. *The Washington Post*, April 3, 1973. Comparative expenditure and related data for schools within this metropolitan area are shown in [34].

16. That is not to say that in a particular jurisdiction satisfaction would not increase as a result of higher service expenditures.

III. WHY FINDINGS DIFFER

A recent article in *American City* compared two frequently referenced fiscal impact studies [63].[1] The author notes that one study on the impact of growth points to "a forty percent surplus of revenues over expenditures" while a similar study showed that a large development would leave the local jurisdiction "more than $100,000 in the red." He figuratively throws up his hands and concludes,

> "Herein lies the problem. We don't really have the facts—pro or con."

The problem cited has been the subject of considerable debate at public hearings which consider rezoning cases or other land use changes.

One reason for inconsistent findings was discussed in connection with study perspectives, namely, the *objective of the sponsor* of the study. Of the many development impact studies reviewed by this writer sponsored by developers, only two residential projects were shown not to produce an excess of revenue to local governments.[2] This would lead to the conclusion that essentially all such nonsubsidized developments produce an excess of revenue to local governments. Studies sponsored by the public sector and nonprofit organizations show mixed results. The *American City* writer was thus expressing the frustration of many who are confused as to the "real" impact of new development.

It is apparent, after examining the many cost-revenue studies, that not all residential developments produce a surplus, nor is it necessary that they should. The fiscal impact is merely one of the criteria, albeit a popular one, which should be applied in evaluating proposed land use changes. An examination of the various studies also indicates that many factors other than motivation of sponsors also account for differences in conclusions regarding the fiscal impact of new development.

Two analysts, given the same data on a proposed development, may differ on the magnitude of the surplus or deficit, and they may even reach opposite conclusions as to whether a surplus or deficit is created. These conflicts are attributable, in part, to the set of initial assumptions, such as the relationship between property values, household income, and the level of anticipated taxes. This set of assumptions applied is influenced by analysts' professional background and their familiarity with the literature on the subject. As to expenditures, the allocation of costs among land uses and between new developments and the rest of the community can result in considerable variations in estimates.

However, given the same data sources, the same initial assumptions, and the same allocation methods, the fiscal impacts of similar developments in the same or different communities are still likely to vary.

The subsequent sections discuss how initial assumptions, allocation procedures, state-local fiscal structures, and intra-community locations affect study results.

DIFFERENCES IN REVENUE ASSUMPTIONS

Most fiscal impact studies sponsored by developers assume, for the purpose of calculating property taxes and revenues, that the official assessed-to-market value ratio will be applied to properties in the new development. Further, it is assumed that this ratio will be maintained for an extended time period once the devel-

1. The two studies noted are [5] and [8].

2. One of the two studies was implemented by a university. An agreement was reached that the findings would be published irrespective of the outcome [13].

opment is completed. In fact, due to inflationary pressures, infrequent reassessments, and other factors, there tends to be a gap between the official and actual assessed-to-market value ratio. For example, the state of California requires a uniform assessment-market value ratio of 25 percent. That is, a dwelling with a market value of $40,000 is to be assessed at $10,000. In fact, however, the median assessment-to-market value ratio in California during 1972 was only 20 percent [83]. Thus, on the average, a $40,000 housing unit would be assessed at $8,000, and would pay 20 percent less in property taxes than predicted by assuming the 25 percent ratio.

Such differences between effective and official tax rates were the basis for some of the adjustments made in a study that recalculated costs and revenues allocated to eleven residential development projects in California [14]. The original study indicated that fiscal surpluses would be shown for ten of the eleven developments [8]. After these adjustments, which increased costs and reduced revenues, the analyst concluded that fiscal deficits would occur for eight and that reduced revenue flows would result from the other three.

Similarly, adjusting the assessed-to-market value ratio from the official 40 percent to the historical 35 percent reduced the projected surplus of a proposed large development substantially [65].

Other initial revenue assumptions that are open to considerable question are that the percent of disposable income subject to the sales tax is independent of household income level and that the sales tax is a function of real property values [9].

CHOICE OF ALLOCATION APPROACH

The methods for determining which local services should be allocated to new developments, and the share to be allocated, can have a substantial impact on estimated expenditures associated with new projects.

How to allocate development-related revenues and expenditures involve decisions by the analysts, and these decisions can lead to a range of differences in study findings. Some of the major allocation decisions include the following:

- Determining which expenditures should be allocated only to the new development, jointly to the new development and the balance of the community, or only to the balance of the community.
- Distinguishing between costs and revenues assigned to residential and nonresidential (commercial and industrial) land uses.
- Distinguishing between costs to present and future taxpayers, as when utilities or other facilities are initially built oversize to meet later needs.

An example of differences in allocating costs to new developments is the previously cited study of eleven projects in California [8]. The analysts in the original study did not allocate the capital costs of services such as libraries, parks, and recreation facilities to some projects. The basis for this decision was that a small increment of population will not require the construction of new facilities. This reasoning, however, is only valid if the projects considered represent the final development to take place in a community. More typically, a project is one of a future stream of developments which will require an expansion of libraries and other facilities to maintain existing service levels. Therefore, a share of this projected cost should be allocated to these projects based on the anticipated level of facility usage by new residents.

In some cases, the costs of such outlays as education are prorated to residential development on the basis of the residential share of the property base [71]. For instance, if in a given community residential property forms 70 percent of the base, only 70 percent of education outlays are allocated to residences, the balance to industrial and commercial property. This approach obviously reduces the public sector costs associated with residential development and makes such development seem to be more attractive than other land uses. However, this approach appears questionable. Since commercial and industrial developments are not *direct* causes of the demand for educational, social, recreational, or library services, the costs of these services (unless specifically designated to serve commercial and industrial facilities) should be allocated only to households.[3] Similarly, to avoid double counting, revenues which accrue as a result of new households, such as higher sales tax receipts, should not be allocated to new shopping centers.

There is no commonly accepted methodology for allocation of costs for services jointly used by residential and commercial developments, such as transportation, public safety, and general government. Ideally, such costs should be allocated on the basis of actual cost incurred. In practice, however, it is difficult to allocate the costs of general government services or highways on the basis of the demand for services from residential and business sectors. As in the previously cited case of

3. A critique [42] of an earlier Palo Alto study [40] indicates that education costs should have been allocated to residential developments on the basis of its share of the property base. This approach implies, incorrectly, that most new commercial and industrial development is linked directly to the population base of a community.

Prince George's County, expenditures for jointly used services are often allocated to residential and commercial development in proportion to the share each represents of the property base. This technique has merit for services linked to the value of property, such as may be the case for fire protection. However, value of the property is usually not linked directly to the amount of service demand generated by a new enterprise. The use of this approach may also confuse the concept of allocating actual costs incurred with the concept of allocating costs on the basis of perceived benefits.

An owner of an expensive housing unit may derive more benefit as a result of police and fire protection compared to an owner of an inexpensive housing unit located in the same neighborhood. However, unless the level of protection differs, the cost of providing the service is likely to be the same. All studies reviewed rely on the allocation principle of costs incurred rather than the value of service provided as perceived by the recipient.[4]

An alternative approach is to allocate jointly incurred costs, such as for police and fire protection, on the basis of directly assignable services provided to each type of land use. In the case of fire protection, one study assumes that 50 percent of the cost is precipitated by actual fires (direct cost), while the other 50 percent is allocated to reserve capacity [38]. The allocation of the former to different types of land use, i.e., residential, commercial, and industrial structures, can be determined from fire department records. It is then assumed, unless more detailed data are available, that the cost of servicing a fire is independent of structure type.[5] Based on this premise, if 30 percent of all fires occurred in commercial facilities, 30 percent of the cost precipitated by actual fires is allocated to these facilities. To allocate this aggregate cost among specific facilities, the cost is divided by the total number of workers employed in commercial facilities. Using this cost per employee value, if a proposed development is anticipated to employ 50 workers, and the per employee cost estimated at $50, the annual fire fighting cost allocated to the development would be $2,500. The cost related to service capacity can be distributed according to the market value of the physical structures. This approach has some merit, since the allocation among land uses is related, at least in part, to service consumption. However, because of variations in cost as a function of location and structure, it is unlikely that this method of allocation approximates closely the cost of fire protection for a particular new facility. Despite these and other limitations, it is recommended, in the absence of more intensive analysis, that service consumption be used to allocate the cost of public safety among land uses.

Cross-sectional data indicate that communities with considerable commercial and industrial facilities have public safety and transportation outlays substantially above the level found in predominantly residential jurisdictions. This difference is not fully accounted for by differences in property value attributed to commercial and industrial structures. It may be, therefore, that the use of allocation proxies such as property values underestimate the actual cost of providing services to the business sector. Higher costs may reflect differences in population characteristics of residents in communities with large commercial and industrial facilities compared to those found in primarily residential communities.

New capital facilities are often designed with overcapacity, considering present demand, to take advantage of scale economies in anticipation of future growth. The decision to build a facility larger than necessary to meet current demand, essentially "locks in" another decision—to develop the area serviced by the new facility in order that the burden of paying for the facility is not fully borne by present residents. In the long run, if the expected development takes place, this should reduce the unit service cost to both present and future residents.[6] However, present residents have to meet the total cost of the facility, most likely in the form of debt service payments, until the facility is fully utilized. What share of the cost should be allocated to future users?

(1) One concept is to allocate to future users only the incremental cost, while allocating to the present users what would have been their unit cost in the absence of scale economies (the unit cost as if the facility had been designed only to meet present demand). Using this concept, the scale benefits accrue only to new users.

(2) An alternative approach would be to charge new users the average unit cost once the facility is fully used. An allocation based on these two alternatives would result, in the short run, in having present residents pay for part of the benefit which will accrue to future residents.

4. For a thorough examination of benefit concepts associated with public services, see: [33].

5. In fact, structure type, fire protection devices on the premises, type of material stored, and the location of a structure are among factors which can contribute to differences in the cost of fire protection.

6. Presumably, engineering calculations incorporating present value concepts demonstrated, given an anticipated rate of development, the long-range savings prior to approval for construction.

(3) A third alternative would be to charge new development, when it takes place, the incremental cost plus the additional outlay imposed on present users until full utilization is achieved. This alternative appears the most equitable, although delays in the anticipated rate of development can result in allocated unit cost to the new users which exceeds the unit cost to present users.

STATE-LOCAL FISCAL STRUCTURE

Residential developments with identical physical and resident characteristics in two contiguous states can have sharply different local fiscal effects. For example, the state of Maryland pays for the construction of new schools from state revenues. On an annual cost basis, the per pupil expenditure for a new school is about $200. The state payment of this large capital outlay in Maryland reduces the *local* expenditures associated with growth. In Virginia, school facilities are financed from local revenue. In most other states, school facilities are either paid from locally derived revenue or jointly by the state and the local school district. As another example, North Carolina and Delaware pay about 80 percent of school district operating costs, while in New Hampshire education is almost totally a local outlay. Similarly, the state-local funding responsibility for other services, particularly transportation, varies among states. These differences in state-local responsibility for financing public services have a substantial effect on the fiscal impact of new residents. In one case, the burdens of new growth may fall heavily on local taxpayers, in another, the state may pick up the tab, and in another the costs may be shared by state and local governments.

Sharp differences are also found among the local revenue structures of certain states. In many states such as New Jersey, the property tax is the dominant local source of revenue. By contrast, the property tax accounts for only 8 percent of the local tax base in Boulder, Colorado. Since the effective tax rate as a percent of income varies on the basis of each community's revenue package, the revenue flow from households of similar income status can be expected to vary substantially among jurisdictions.

Overlapping taxing districts can also affect fiscal flows. For example, one proposed development in Contra Costa County, California would pay taxes to sixteen tax districts [11]. The development may create a surplus to the cemetery district (few early deaths are projected!) but a deficit to the school district.

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INTRA-COMMUNITY LOCATION

In addition to variation in the fiscal structures of many states, the impact of a development can vary according to its location within a community. Most new developments, particularly those having low density, are built on the periphery of developed areas, thus requiring new schools, utilities, and other capital expenditures. Frequently, location is a more important factor than the density of development in precipitating capital costs [64]. A study of Fairfax County, Virginia [27] illustrates the impact of alternative locations within the county on the cost of capital facilities.

It should not, however, be assumed that the existence of unused public facility capacity will necessarily spur development in an area. Locational decisions that are uneconomic from a public viewpoint may be rational from the perspective of private developers, since their cost of unimproved land tends to be lower as the distance from employment centers and transportation corridors is increased. Therefore, the public cost of incentives to private developers has to be compared to public savings which could result by encouraging investment to areas with unused capacity.

Current expenditures as well as capital outlays can also differ in various locations within a community. As noted in the Prince George's County study [27], there are major intrajurisdictional differences in per household outlays for police, fire, education, health, and welfare attributable to both differences in household characteristics and, for some services, location.

SPATIAL SCOPE OF ANALYSIS

The spatial limits of fiscal impact analyses depend primarily on the perspective of the sponsor.[7] A local jurisdiction is likely to be concerned only with revenues it can collect and costs of services the community provides. A county government will seek to examine the fiscal impact of a new development on all taxing districts within its boundaries, such as schools, flood control, and fire protection. A regional agency will consider multicounty fiscal interactions.

In some cases, what is a surplus to a local government may result in a deficit to the county or region. Conversely, it has been shown that a development which creates a deficit at the county level can produce a surplus to the state [76].

7. See, for example, differences in the geographic scope considered relevant to estimate fiscal impact by the same organization in two locations, [42, 45].

IV. FISCAL IMPACT ANALYSIS – MAJOR ISSUES

Most fiscal impact studies examined limit their scope of analysis to direct cost-revenue effects of new development. A number of broader, longer-term aspects have been excluded from most of these studies. To a large extent, this reflects the undeveloped state of the art of fiscal impact analysis. However, these are major issues and it should serve a useful purpose to note information that is presently available about them as well as the gaps in present knowledge. The discussion that follows, therefore, is addressed to the following questions:

- What is the impact of new development on the incremental cost of providing services and how will revenues be affected?
- How do service preferences of new residents influence the tax and service structure in a growing community?
- What distributional effects are likely to accompany various forms of new growth?
- What secondary or indirect effects of development need to be considered?
- How does the time horizon influence study results? Should both short-term and long-term effects be analyzed?
- What fiscal interactions exist among local communities and other jurisdictions?

THE FISCAL EFFECTS OF CHANGES IN POPULATION AND DENSITY

An expanded scope of fiscal impact analysis should consider the effects of cumulative development on the cost of providing additional services and on the level of anticipated revenue from households and firms. Most fiscal studies assume that the cost of providing an additional unit of service is equal to the average cost. This section will discuss factors which can affect the incremental cost of providing services to new residents and firms.

For purposes of this report, scale economies or diseconomies will be defined as changes in the unit cost of providing services as the number of service units expands, holding service quality constant.[1] This broad definition incorporates changes in service cost as population expands that are attributable to many factors, some of which will be identified in this section. In some cases, these are offsetting factors. For example, fewer internal roads may be needed if a new development will concentrate new housing units in highrise apartments rather than building detached housing units which may be typical of older developments. In this case, the incremental cost of roads for the additional housing units will be below the average community cost. However, if adding a large number of units, regardless of their configuration, requires greater per capita outlays for major roads in the community or region, the aggregate fiscal impact may be neutral. If large communities have to pay higher wages to their municipal workers, as compared to smaller jurisdictions, because equivalent housing and other components of the cost of living are more expensive, this will be considered a diseconomy. While housing is generally a private cost, if it contributes to higher wages for municipal employees, part of this

1. The discussion in this section deals only with services provided by most local or county governments. Specialized services, such as museums, graduate schools, and comprehensive medical facilities require a very large population to take advantage of scale economies.

private cost is shifted to the public sector. Similarly, congestion is primarily a private cost, but delays in providing public services caused by congestion are likely to increase the cost of these services.

Higher or lower incremental costs due to changes in efficiency should not be confused with changes in demand. The number of children attending public schools may increase above the community housing unit average because new developments are comprised primarily of large, low-density housing. This increase, in itself, is not a scale diseconomy, since the number of units serviced has changed from the previous average. Changes in *per pupil* expenditures attributable to increased enrollment would be considered scale economies or diseconomies.

The importance of considering scale effects can be illustrated by the following example:

> A community with a balanced budget is considering the impact of two new developments which will add 3,000 students to the 19,000 presently in public schools. Data show that once a total enrollment of 20,000 students is reached, the unit cost per pupil for servicing each additional 1,000 students increases an additional 2 percent, holding service levels constant. Let us suppose that the new developments, given existing tax rates, raise sufficient revenue to meet the cost of education and other public services, including the higher cost due to scale diseconomies imposed by new residents. A cost-revenue impact analysis of the development would show a neutral fiscal flow (revenues balancing expenditures). However, since the unit cost for all students, including original residents, would be raised, a fiscal deficit would be shown by the balance of the community. Increasing taxes to a level which would offset the aggregate deficit would result in a fiscal surplus from the new residents to the balance of the community, although the original residents (as well as the new ones) had their tax rates increased to meet the deficit caused by the new residents.[2]

Given economies of scale, the opposite result would be shown: original residents would benefit by lower tax rates since the increased number of residents serviced reduces the average unit cost.

The example illustrates two points: all residents—new and old—can be affected by economies and diseconomies of scale; and, if scale effects are present, a fiscal flow study confined only to a proposed development may not accurately represent its impact on the total community.

Scale effects are difficult to identify when considering an individual development. They may become crucial, however, when evaluating the cumulative impact of many individual developments.

The scale effects associated with new population should be considered in terms of their impact on capital outlay, operating expenditures, and revenues. To determine scale effects over time, however, one should consider capital and operating costs concurrently.

Capital Outlays

Additional development can affect the unit cost of constructing public facilities by (1) increasing the ability to take advantage of scale economies in plant construction, (2) increasing the population and geographic size of the urbanized area, and (3) changing density within the area of development. These three effects need to be considered independently.

Capital facilities provided by the public as well as the private sector can have a theoretically optimum size, at which point they can obtain a minimum unit cost. For example, a particular tertiary treatment plant may require a population of about 30,000 to operate at its most efficient point. If a community with 25,000 residents requires that such a facility be built to meet service standards, the addition of 5,000 persons would reduce the unit cost to each user. Optimum plant sizes for school buildings have also been suggested [38]. However, the optimum size tends to vary over time as a result of technological and other changes. In determining the appropriate size of schools and other facilities, both initial outlays and operating costs over the economic life of the facility have to be computed. In addition, private costs (such as the distance to drive a personal vehicle to obtain a public service) should be considered.

A growing community can take advantage of scale economies through comprehensive planning geared to optimum facility size and by controlling the location, density, and pattern of development to the degree possible. Of course, optimum facility size needs to be balanced against the many other fiscal and nonfiscal considerations that should be incorporated in land use plans and controls. For example, if a community builds facilities larger than short-term demand dictates to take advantage of scale economies, the decision to approve additional development has been implicity taken.[3] Impact analysis would, however, remain a useful instrument if alternative development projects are under con-

2. While this example is hypothetical, education finance data show per pupil costs rising as enrollment expands beyond a threshold value, due primarily to higher salaries in large districts.

3. Capital cost allocation is briefly discussed in Appendix A.

sideration for the same site or if the negative fiscal flow from a particular development being considered is greater than the incremental cost of not having capital facilities fully utilized.

Although there has been some discussion about potential scale economies in growing areas, empirical data on the subject remains limited.[4]

A second factor which can influence per capita outlays for capital facilities is the increase in the population and geographic size of the urbanized area as a result of new development, independently of scale economies in plant construction. As population expands, is the incremental cost of additional capital facilities above or below average cost? Data on this subject is again limited, since studies examined deal primarily with the cost of facilities necessary for relatively small total populations. However, one study, based on both simulated models and empirical data, indicates that the per capita cost of primary roads increases by 50 percent as total population rises from 50,000 to 250,000 [44].

Per capita annual capital outlays for most functions, as well as gross debt outstanding, as shown in Table 1, rise as urban population increases.[5] Although these data do not isolate the many variables which influence capital expenditures, it would appear that public sector savings which may accrue from scale economies in large urban areas are more than offset by other factors, such as the necessity to construct and subsidize the operation of mass transit systems.

The third factor one needs to consider is the impact of development patterns, particularly density, on capital outlays. Utilities such as water, sewerage, natural gas and electricity collect or distribute their product by a system of pipelines and cables. For example, the length of sewerage trunk lines, and thus the initial capital outlay per dwelling unit, can be reduced by increasing the density of residential housing. Many of the

4. A study of new communities in Great Britain concludes that scale economies in the construction of public facilities such as water and sewerage are exhausted when population reaches a size of about 50,000 [44]. For an analysis of scale economies in sewerage treatment plants, see [38].

5. The cross-sectional data in Table 1 show average costs which reflect historical development and population change patterns, not the incremental cost of services to a new household.

Table 1. PER CAPITA OUTLAYS FOR SELECTED MUNICIPAL FUNCTIONS, 1970-1971

FUNCTIONS	City Population Sizes (as of 1970) Less Than 50,000	50,000-99,999	100,000-199,999	200,000-299,999	300,000-499,999	500,000-999,999	1,000,000 or more
CURRENT EXPENDITURES[a]							
Police Protection	$ 16	$ 21	$ 24	$ 26	$ 28	$ 41	$ 55
Fire Protection	9	17	20	20	20	21	23
Sewerage Operation	5	5	5	6	8	8	4
Sanitation	6	8	9	13	10	12	19
Parks and Recreation	6	12	14	16	20	18	13
Libraries	2	4	5	2	4	6	6
General Government[b]	8	9	9	11	9	17	16
TOTAL	52	76	86	94	99	123	136
CAPITAL OUTLAYS							
All Functions	29	41	52	64	66	71	83
Water Supply	5	6	5	7	6	7	8
Sewerage	6	7	10	10	10	10	10
GROSS DEBT OUTSTANDING[c]	234	277	330	427	423	457	813
DENSITY (Per Square Mile)[d]	n/a	n/a	4,681	5,261	5,697	6,853	12,750

SOURCE: U.S. Bureau of the Census, *City Government Finances in 1970-1971*, Washington, D.C., 1972.

a. The data shown reflect total outlays per capita. The values are not adjusted for differences, if any, in the scope of services or other factors.

b. Financial administration and general control.

c. Per capita.

d. Average population densities for each city size category. For 100,000-199,999, based on random sample; for other categories, includes all cities.

reports noted in Chapter 2 provide comparative data, based on simulated conditions, on the cost of capital facilities as housing density is changed, with the total number of housing units held constant [36, 37, 38, 43]. However, since this report is aimed primarily at public costs and revenues viewed from the local perspective, distinctions between private and public outlays should be noted. Utilities such as water and waste treatment usually charge user fees aimed at recovering the capital and operating costs associated with the level of use. Systems within a development, such as internal roads and sewer lines are, in most cases, constructed by the developer. As a result, most savings associated with increased density shown in these studies are private rather than public savings.[6]

The cost of purchasing additional land for public facilities is also likely to rise as the available supply within an urban area decreases. This has been shown in a study which compares site acquisition costs for schools in jurisdictions with varying populations and densities [38]. The report shows that large, high density urban centers have higher land acquisition and construction costs (on a per acre and per square foot basis, respectively) compared to lower density cities and suburbs. Prudent advance acquisitions of sites also may result in long-term savings. Since the cost of land has been rising faster than the cost of construction, delaying site purchase to await scale economies associated with larger facilities may offset operating economies. Whether concentrated growth to take advantage of scale economies or scattered growth within urbanized areas results in lower per capita outlays depends on the utilization rate of the existing infrastructure [46].

Operating Outlays

Changes in operating outlays resulting from small developments are difficult to isolate. Considered by itself, a development of fifty or so housing units in a large community may have no visible impact on public safety and other noneducational operating outlays. This is the result of the "lumpiness" of a service. That is, only the collective effect of a number of small developments are likely to trigger additional manpower or equipment. It is obviously impossible to add half a patrolman or half a squad car. Once added, however, there may be overcapacity until demand expands.

Although "lumpiness" of a service is a problem in evaluating the fiscal impact of some developments, the major limitation of the typical cost-revenue analysis which allocates current average per unit service costs to both small and large developments, is that unit costs are not constant as a community grows. As a result, the collective impact of development on expenditures is likely to differ from projections based on current per capita average costs.

A considerable number of studies have examined the relationship between per capita service costs and population size or density. The pattern, according to the more recent studies, is that unit costs of most services rise as population or density increases beyond a threshold level.[7]

A frequently found pattern is for per capita costs to be reduced as a community grows to a population of between 10,000 and 50,000. In communities smaller than 50,000 the incremental cost of providing services is often below average cost, indicating that development, from a fiscal viewpoint, should be encouraged.[8]

For communities with greater populations, as shown in Table 1, per capita outlays for labor-intensive services usually funded from local revenue sources rise.[9] However, one should be careful not to attribute higher costs primarily to greater population size. Population density, as shown in Table 1, increases as population rises. This is not surprising, since most cities cannot annex contiguous incorporated jurisdictions. Large cities with comparable population size and similar median income, but lower densities, as in California, have substantially lower per capita outlays for most local services. The per capita cost of roads, however, is more a function of population size than density.

Adding a new residential development to an urban area with a population of 50,000 is, from a transportation perspective, less expensive than adding the same development to an urban area of one million.

On the basis of his examination of service costs in New Jersey, Sternleib concludes, "municipal officials in moderately growing communities looking to reduce per capita costs may try to hold population at the 10,000 to 25,000 mark since it is at this population

6. A clear distinction between public and private costs is often not possible. For example, matching federal grants are frequently provided for the construction of water sewerage treatment plants, while the local government share is met by user charges. In most areas, roads internal to a project are built by the developer, while the maintenance of these roads is a public responsibility. In some cases, user charges do not reflect the full incremental cost of extending services to an area, shifting the cost to other users in the community.

7. For a review of some of the literature on this subject, see: [34]; also: [47, 48, 49, 50, 51, 57, 58].

8. Since communities of 50,000 residents or less are grouped in Table 1, these scale economies are not evident in this tabulation.

9. Costs have also been rising faster in larger communities. Between 1965 and 1972 per capita current expenditures in the largest cities have risen 140 percent, in cities with 50,000 to 100,000 inhabitants, only 85 percent [89].

level that per capita costs are lowest" [58].

Most studies examine costs of specific services rather than aggregate expenditure levels. For example, there is considerable evidence that small, isolated school districts have higher per pupil outlays for equivalent school services compared to somewhat larger school districts. However, beyond a minimum school district size, the reduced cost of transporting students in comparison to smaller districts is offset by higher per pupil instructional outlays.[10] Concurrently, a reduction in school enrollment, which occurs in areas of the nation which have outmigration (particularly in large cities and rural areas) also leads to higher per pupil costs since plant operation and maintenance costs remain unless a facility is closed.[11]

In the case of expenditures for police services, almost all studies show that as population and/or density increase, per capita outlays rise once a threshold of about 10,000 residents is reached. This rise is attributable to more police manpower per capita, and, to a lesser degree, to higher wages and more sophisticated equipment utilized in larger communities. Data collected annually by the Department of Justice, which show more police per capita and higher crime rates as the size of a community increases, support these studies [92]. In contrast, fiscal impact studies of new developments show that the demand for police services, as indicated by crime rates, is at or below the community average.[12] It would appear, therefore, that if the incremental cost of providing police services to expanding areas is below the community average, the per capita communitywide costs should be reduced as the population grows. A number of explanations can be offered for this inconsistency: The new population demands more sophisticated police services, or inmigrants to housing in older areas vacated as a result of housing expansion on the periphery have a higher crime incidence. Perhaps more important, however, is that crime-related services account for only a small share of total police calls. Police services such as traffic control and protection of commercial facilities extend beyond the boundaries of the new development. As a result, examining police demand only within a development is an inadequate measure of additional services which are required as a result of growth. Finally, the state-local provision of police services shifts as a community grows, with less reliance on the state police in larger communities.

Increased per capita costs for fire protection in higher density areas are due primarily to higher wages and more sophisticated equipment as well as more building fires and alarms per capita in communities with highrise or intensive commercial-industrial development.[13] The need for fire stations in newly developed low-density residential areas is due primarily to the areas' distance from existing service, rather than the number of new dwelling units. In very low density areas, per capita public sector outlays for fire protection tend to be low, but the private cost, in terms of the probability of a total loss, is high and fire insurance rates reflect this fact. As with other services, wages paid to firemen are likely to be an important reason for varied per capita outlays between large and small jurisdictions. Despite the impact of location and building type on the cost of fire protection services generally, a number of communities utilize a fixed ratio of firemen per 1,000 residents.[14]

Health and welfare costs are not directly affected by changes in scale associated with the collective impact of development, except for higher wages for public employees. Since new residents of nonsubsidized new housing tend to have incomes above the community median or mean, per capita costs are likely to be reduced in areas of rapid growth. In the case of subsidized housing, social service costs may increase; however, these costs are essentially income transfers from one group of households to another. As these costs reflect broader income redistribution objectives, state and federal agencies now provide the major revenue source for these programs.

Economies of scale are not shown in the case of larger jurisdictions, even for capital intensive services such as sewerage treatment and water supply.[15] Per capita operating costs for sewerage treatment plants, based on national data, increase for cities with up to one million inhabitants. The nation's largest cities, however, have the lowest operating costs for sewerage treatment.

The causes for the relationship between population size, density, and cost of services are not fully understood. Factors which have been cited include congestion and inefficiencies associated with large governmental organizations.[16] There is more substitution of public for previously private or quasi-public services such as fire protection and recreation as density in-

10. This is attributable primarily to higher salaries for equivalent education and experience.

11. This problem is present even in spatially large communities with net inmigration, such as Fairfax County, Virginia, or Montgomery County, Maryland, due to the continuing decline in the birth rate as well as to the new growth on the periphery of urbanized areas.

12. See, for example: [9, 24, 27].

13. For discussion of this subject, see: [59].

14. In Santa Clara County, communities maintain a ratio of one fireman per 1,000 residents. See: [80].

15. In New Jersey and Ohio, sewerage service costs are higher for cities with over 250,000 persons. See: [51].

16. For a discussion of some of these factors, see: [53].

creases. An important factor is the higher public service wage structure found in larger communities, reflecting both higher living costs and stronger union bargaining power and, in some cases, adverse working conditions. These increased wages are not usually offset by rises in productivity, in contrast to much of the private sector, since most public service functions, with the exception of utilities and road maintenance, are labor-intensive and do not enjoy many of the productivity gains associated with improved technology.

Two factors, in addition to wage differentials, appear dominant: the change in the socioeconomic characteristics of the population and more intensive nonresidential land uses in urban areas with high population densities. The net outmigration of middle-income households from high density cities creates a greater demand for public services, which requires more personnel per capita—the major cause for higher per capita operating outlays. Intensive commercial development in large metropolitan areas results in private rather than public scale economies, and requires higher capital outlays.

Revenues

The collective effect of development on income and property values—and thus on potential revenues—has not been thoroughly examined by researchers. As a result, only general observations can be made. Per capita personal income rises more rapidly in growing communities than in other jurisdictions. The dominant factor in this pattern is that the new residents have permanent incomes which tend to be higher than for the base population.[17] However, the expansion of general economic activity, higher sales, and additional employment opportunities for existing residents are also likely to increase the personal income of many residents. Since prices tend to be higher in large urban areas, wages in both the private and public sector reflect this increased cost of living. These effects tend to reflect a long-term pattern of growth, and are unlikely to be the result of one development. Land values, and thus property tax revenues, can also be expected to rise in areas of rapid growth reflecting more intensive use plus anticipation of further development.[18]

Given the premise that there is a rise in both personal income and property value due to cumulative growth patterns, local revenues can be expected to increase more than would be shown by simply estimating the anticipated revenue flows from each individual development.

Higher revenues to the public sector which can result from greater economic activity, particularly commercial activity, in large urban centers may partially offset higher per capita public services costs. For example, higher wages for public employees may be representative of higher income for most households residing in large urban centers. This, in turn, would reflect an increased ability to pay for public services by larger as compared to smaller jurisdictions. A greater share of the total service cost can also be shifted to business firms.

In California, median family income declines slightly as the population of cities expands [41]. These California data include only cities which had an increase in population during the last decade. Income data from cities across the nation, shown in Table 2, indicate a mixed pattern. Both the largest and smallest cities for which data were obtained have per capita and family incomes above the level of other cities.

The costs of local services, as a share of income, vary from 2.1 percent for cities in the 50,000 to 100,000 group to 4.0 percent in the largest cities.[19] However, since the commercial share of all property is greater in the large cities, part of the service cost is shifted from households to business firms.

Commercial and industrial property as a share of all property increases from 29 percent in cities with population in the 100,000-200,000 category to 40.4 percent in cities with over one million inhabitants. These data suggest that large cities, particularly those with high population densities, do attract more commercial property than smaller communities, including most suburbs of central cities. This reflects one of the economic benefits of concentrated population. If one assumes that the percentage of residential property is a crude proxy for the share of local taxes paid by households, only about two-thirds of the service costs in cities shown in Table 2 are borne by their residents. Adjusting per capita outlays to reflect only the household share reduces somewhat the gap in the percentage of income allocated for selected local services as population size varies.

Impact of Outmigration

The available data strongly suggest that large jurisdictions, particularly those with high population densi-

17. Demographic and socioeconomic characteristics of inmigrants to major urban areas are shown in [90].

18. For example, a study of land sales in Minnesota [67] indicates that the rise in sales price was faster in metropolitan counties of rapidly growing areas compared to slower growing regions.

19. Service costs shown in Table 1 are for all cities, including those which have declining populations. Large cities with declining populations have higher per capita outlays than cities which are gaining residents. However, the pattern of service costs as a percentage of income rising as a function of city size appears to hold. See: [75].

ties, have high per capita outlays for many services. In part, this is attributable to some of the factors identified which are independent of population characteristics. In part, higher per capita costs reflect the outmigration of middle income households from central cities and many inner suburbs during the last two decades, which does not significantly reduce the demand for noneducational services, particularly social services, by the remaining population. Reduced population size, in this instance, does not lower per capita outlays, while the cost of providing services to new development aimed at middle income households should be substantially below the average for all families. Conversely, the cost of providing services to similar middle-income households moving to a large, rapidly expanding suburb is likely to be at or above the community average.

Notes of Caution

There are two notes of caution in examining scale effects. *First,* time series data showing community expenditure patterns should be used with care. The mere fact that per capita service costs in constant dollars are rising over time in a growing community may not necessarily be linked to the rate of growth but may be due, rather, to an overall rise in public service costs. Cross-sectional data which compare expenditure patterns in slower growing jurisdictions are one basis for determining whether such changes were typical of other communities, independent of their growth rate.

Second, some research suggests that in the short run rapidly growing communities have reduced per capita costs following a spurt in population size because of initial excess capacity in public facilities or, more typically, a lag in the budgetary process. These results should not be confused with longer-term trends.

SHIFTS IN PREFERENCES FOR SERVICES AND TAXES

Preferences of new residents for "tax packages" and services may differ sharply from those of the base population. The importance of these preferences is suggested in the following illustrative example:

> A new development is planned in a predominantly rural county on the fringe of a metropolitan area. The new residents will consist primarily of young households—former central city residents—with incomes above those of the base population. These new households will form a voting majority in their new jurisdiction. On the familiar assumption of many fiscal impact studies that the new residents are comparable to the old and that the previous per capita service costs will persist, revenues and costs associated with the new development are projected to be in balance.
>
> When the new development is completed, however, neither revenues nor expenditure patterns behave as projected. New residents vote to construct a better high school and to provide

Table 2. OUTLAYS FOR MUNICIPAL SERVICES AS A PERCENTAGE OF INCOME, 1969-1970

	City Population Sizes (as of 1970)						
	Less than 50,000	50,000-99,999	100,000-199,999	200,000-299,999	300,000-499,999	500,000-999,999	1,000,000 or more
Outlays for selected local functions (per capita) [a]	$52	$ 71	$ 81	$ 96	$ 98	$ 116	$ 138
Mean per capita income:							
All cities	n/a	3,309 [b]	3,318 [b]	2,984	3,165	3,222	3,451
Cities with increasing population	n/a	n/a	3,385 [b]	3,050	3,241	3,260	3,677
Outlays for local functions as percent of income [c]	n/a	2.1%	2.4%	3.2%	3.1%	3.6%	4.0%

SOURCES: U.S. Bureau of the Census, *City Government Finances in 1969-70*, Washington, D.C., 1971; and U.S. Bureau of the Census, *General Social and Economic Characteristics*, State reports, Washington, D.C. 1972.

NOTES:

a. Combination of total current expenditures (as defined in Table 1) and annual debt payments in 1969-70.

b. Based on random sample of fifty cities. Remaining data on these lines are for all cities in their respective size categories.

c. All cities. Note rise in current expenditures between 1969-70 (Table 2) and 1970-71 (Table 1). Increases amount to 12.4 percent for largest cities, 10.6 percent for smallest cities. Per capita metropolitan personal income increased by 6.3 percent between 1969 and 1970.

extras, such as additional college preparatory courses, that the older residents did not desire. The newcomers want to improve access roads to employment centers where most of them work.

Collectively, in short, the new residents in this hypothetical case have public service preferences whose costs far exceed the level previously provided to the base population. The new residents are willing to increase their tax contribution but impose the higher rates on *all* residents to cover the cost of these outlays. Under these conditions, the new development fiscally "pays its own way." However, the old residents are implicitly subsidizing the new residents.[20]

Shift in Service Demand

The hypothetical example above is based on observations of communities undergoing urbanization. Property taxes in rapidly growing semirural communities of Virginia have risen more quickly than in similar communities with stable populations, primarily to finance the expansion of locally provided public services. A similar pattern has been shown in semirural Michigan counties [84].

The likely cause for these shifts in preferences in the urban fringe are the characteristics of new residents. They are typically younger, with more school-age children, of higher social rank (in terms of occupation), and with expectation of more lifetime income than the long-time residents of the suburban areas.[21] As incomes rise, demand often grows for "luxury type" services—parks, recreation, libraries, and special school programs. This phenomenon may reflect, in part, the federal and state income tax regulations that enable higher income taxpayers to deduct their local tax costs of these services, thus obtaining them at less cost than if they purchased similar services privately.[22]

Empirical data on expenditure shifts in growth areas attributable to preferences of new residents are somewhat limited. There is considerable evidence that per capita outlays increase as population grows, but it is not easy to distinguish between higher outlays due to diseconomies of scale, discussed previously, and those due to different preferences among new residents. There are some data, however, which show that growth results in more rapid rise in local taxes than the rise in income attributable to new residents [78], causing increased tax burdens.[23]

Shift in Revenue Sources

The property tax is the dominant source of revenue in rural and small urbanized areas. As the demand for public services increases as a result of growth, revenue sources tend to be diversified. Although property tax rates are likely to increase, the relative importance of this revenue source declines as additional taxes and fees—sales, income, utility, and business levies—are added. These additional taxes reflect (1) preferences by new residents for a broader tax base as property tax rates increase, (2) the ability of a larger jurisdiction to efficiently administer new taxes, and (3) the increased ability of expanding communities to shift part of their added tax burden to nonresidents.

If the people who lived in an area before the period of new growth do not want the new services and the higher taxes, and if they hold sufficient political power, of course they can then block the bond issues or tax increases.

Importance of Preference Shifts to Jurisdictions

Communities which anticipate that new development may bring inmigrants whose characteristics deviate from the existing population base should pay attention to preference shifts in assessing fiscal impact.[24] Although studies are limited, the pattern which emerges indicates that as the characteristics of residents shift from rural to urban, higher local taxes as a percentage of income result. This is attributable to higher demand for public services and higher wages for municipal workers. A community which anticipates such change should examine the fiscal pattern of other communities in the region during the time span of rapid urbanization as a means of estimating the likely impact of new population on service demand and revenue needs.

DISTRIBUTIONAL EFFECTS

Distributional effects associated with new development which may have direct fiscal consequences are generally overlooked in cost-revenue studies because of their complexity and the premise that they are outside the scope of these efforts.

This section discusses three types of distributional

20. Technically, the marginal cost to the older residents of the new service would be greater than the marginal benefit they perceive. Concurrently, the marginal benefit to new residents may be higher than their cost.

21. Inmigrants to central cities and some mature suburbs may have different characteristics than the ones described here.

22. Taxes imposed by local and state governments are deductible expenditures for federal income tax purposes on the questionable premise that there is no direct linkage between such taxes paid to benefits received.

23. For additional discussion of factors which increase public costs more rapidly than revenues in an area of rapid growth, see: [60].

24. For an example of such a development, see: [12].

effects—the shift in service demand from one area to another within a community or region as a result of a new development; fiscal benefits from the standpoint of an efficient distribution of new households within a region; and the income distribution effect of changes in the local tax structure or allocation of funds for local services.

Changes in Housing Mix

One study of a new community, following the pattern of similar efforts, assumes correctly that the addition of high-density housing with few bedrooms per unit will attract households with fewer children than detached housing developments.[25] The study, however, further assumes that larger families (those seeking three or four bedrooms) would not seek lower-density housing in the balance of the county or even the state within which the development is located [36]. Based on this assumption, it is concluded that the demand for local and state services, particularly education, would be sharply curtailed, resulting in a fiscal surplus from the proposed development to the community and state.

It is more likely, however, that aggregate demand for schools and other services has not been appreciably reduced as a result of the development, but merely shifted or distributed to another location within the community, region, or state. If this alternative hypothesis is valid, the approach of such studies needs to be reexamined.

Interurban migration is motivated by many factors, with improved employment opportunities (higher wages, less unemployment, or both) a major consideration.[26] It is doubtful if any significant migration to most *regions* is encouraged by a strong preference to live in a particular development or even community within a metropolitan area. The construction of smaller, less expensive, higher-density units may encourage some households who would otherwise not have moved to the community to locate in new units. However, for other potential households, the higher density construction will not meet their perceived housing needs and thus will result in a shift of families with children to larger units (new or old) in other parts of the jurisdiction or region. If the community restricts large detached housing units, there will be a spillover of demand to other jurisdictions within the region. If all suburban communities in the region restrict such housing, some demand will spill over to jurisdictions on the periphery of the region, with some shift to the central city.

Some larger households, as the cost of larger units rises, will occupy the new high-density housing, while others will compete for the existing detached housing stock within the community. These new households are likely to have demographic profiles which differ from those presently occupying either high-density or detached housing units. Thus, the number of children attending public schools after these readjustments will differ from the level assumed based on existing patterns. This, in turn, would require that fiscal calculations be adjusted to reflect the change in the number of school children per household.

The point is that the number of families who will utilize public schools and most public facilities in a region or state will not be significantly reduced by shifts in the mix of housing. In spatially large jurisdictions most redistribution of service demand will be local. Smaller communities, however, can affect service demand by altering their mix of housing.[27]

Efficient Location of Households

The availability of public facilities should be one of the major considerations in determining the most efficient location of households from a regional planning viewpoint. For example, a mature suburb with considerable outmigration may be encouraging the construction of high-rise apartments, although substantial open space remains for lower density development.[28] Such a community is faced with the problem of closing elementary schools in excellent physical condition due to the decline in its school-age population. An adjacent community, because of an influx of households with school-age children, requires a large school construction program. From a regional perspective, this is an inefficient location of new households with children. Household location is emerging as a major issue as large operating subsidies are foreseen for mass transit, including the BART system in San Francisco and Metro rail system in the Washington, D.C. metropolitan region. Utilization of

25. Note that most highrise developments, with the exception of very expensive condominiums, average no more than two bedrooms per unit. Detached housing units tend to have three or four bedrooms. One study considers a typical highrise unit to have 900 square feet, a typical detached unit 1,600 square feet [43].

26. In addition to moves to take advantage of employment opportunities, households migrate to areas because of climate and scenery, for access to urban amenities, and to seek privacy. For a discussion of other nonemployment factors that influence interregional migration, see: [74].

27. Inner suburbs of Washington, D.C., such as Arlington and Alexandria, Virginia, which have experienced sharp increases in the number of highrise apartment units, have rapidly declining school enrollment.

28. High land values, in anticipation of intensive development, are an important factor contributing to this pattern. There are other factors which encourage this trend. Thus, the pattern may emerge without the encouragement of local officials.

mass transit increases if intensive development is located close to transit stations, which may reduce operating deficits. However, there are insufficient data to indicate the fiscal impact of household locations on operating deficits of mass transit systems.

The fiscal implications of alternative location strategies for new development require additional examination. A tentative step in this direction has been taken by a community which estimated differences in capital outlays given alternative locations of new households [28]. Unfortunately, data on regional approaches are limited since most communities are unwilling to surrender any of their land use controls to areawide authorities.

Income Distribution

A surplus from new development can either reduce taxes or provide additional revenue to expand services. Since most residents pay local taxes and consume some local services, the beneficiary group tends to be large. Since deficits from new development result in higher taxes or fewer services, they similarly affect a large group. If new development creates a surplus to the state government, all its residents may benefit. However, the magnitude of surpluses or deficits has to be substantial to result in any measurable impact. Commuters can also benefit if surpluses are used to improve services, such as transportation, consumed by this group. Both disposable income and income "in kind" can thus be affected by new development.

A secondary but important result of fiscal surpluses is that local property values increase, reflecting lower taxes or more services which accrue to residents of the property. This benefits present property owners, but increases the initial capital outlay necessary to purchase housing by potential inmigrants and others.

Independent of surpluses or deficits, the preferences of residents in new developments, as noted earlier, can cause a change in either the tax structure or in the allocation of funds for services. Either shift is likely to affect the income distribution of residents. For example, a shift from a utility tax to an income tax is likely to result in a less regressive (or more progressive) tax structure. If the aggregate level of taxes is unchanged, lower-income households would have a slightly higher after-tax income than previously.[29] If residents of new developments cause a shift of expenditures from housing and hospital care for the elderly to expanding services in public schools, the middle- and higher-income new residents may have lower outlays for otherwise privately financed after-school activities, while the elderly are financially worse off.

Constraining new housing, and thus population, in areas which are perceived as highly desirable will increase average household income (in the absence of policies to subsidize units) since inmigration will be limited to more affluent families who can afford to compete for the existing housing stock. For example, Boulder, Colorado estimates that new family income would increase from $18,259 to $19,591 if the population could be limited to 122,000 residents in 1990 rather than a higher level [24]. However, as noted earlier, the regional demand for education and other public services is unlikely to be substantially diminished by the growth policies of one jurisdiction. Rather, the demand is shifted to nearby communities.

SECONDARY IMPACTS

Most of the cost-revenue studies completed to date focus on the primary fiscal effects of new development. While it is recognized, for example, that a residential development creates a secondary demand for commercial facilities to provide goods and services for the new residents, fiscal implications of such secondary effects are usually not included as part of cost-revenue analyses.

From a community perspective, the following secondary growth effects of new development which have fiscal implications require consideration:

- Changes in the value of surrounding land and structures.
- Increased demand for goods and services resulting from residential development.
- Increased demand for housing and services as a result of industrial development.
- Increased demand for housing and services as a result of commercial development.
- Increased activity on the periphery of new development.

The secondary effects listed can have a major fiscal impact on a local jurisdiction. For example, if the value of open land increases near the new development, property tax receipts increase without a concurrent increase in local expenditures. The geographic size of a community and the intensity of the development and its location within the jurisdiction determine, to a considerable extent, to what degree secondary effects spill over to nearby jurisdictions.

Changes in Value of Surrounding Property

One approach for estimating the impact of a recent development on land values is to compare before and

29. There are other, more significant nonfiscal impacts of new development on income. These include higher employment rates and higher wages.

after sales and/or assessment data for similar parcels of land, taking into account inflation and other factors.

Frequently, a professional appraiser or realtor active in the land market can estimate whether a new development enhanced or reduced the value of surrounding land and improvements, based on his or her knowledge of land and housing transactions. In addition, cross-section analysis has also been applied to estimate the likely impact of new developments on nearby residential property [85]. This research shows that, in one large metropolitan area, the construction of apartments reduced the value of detached housing nearby while the construction of detached housing increased the value of the existing predominantly single-family housing stock.

While land values contiguous to new developments can be expected in most cases to rise in anticipation of further development, particularly intensive development, this may be offset by a proportionate reduction in relative land values elsewhere in the community or region if total demand for housing and commercial facilities is unaffected. In this case, increases in land value would represent a locational shift rather than a net change. The validity of this assertion remains to be tested empirically.

Increased Demand for Goods and Services Resulting from Residential Development

It is feasible to estimate the level of additional demand created for goods and services if the household income of new residents is known. These income data, in turn, can be converted into estimates of increases in the square footage of commercial space required, and resulting additional net property and sales tax revenues. In making such estimates, it is necessary to consider what proportion of the new demand is likely to be met by business enterprises within the community, compared to the share of demand "leaking out" to other jurisdictions. In addition, already present excess commercial space, built in anticipation of future growth, should be taken into account. The proportion of additional sales volume not accounted for by higher disposable income of old and new residents or by likely purchases from residents of other jurisdictions represents a shift in the location of new sales from another part of the community rather than a net increase.[30]

It is likely that some convenience goods retail stores and gas stations, if zoning permits, will locate near new housing. New residential development has not, however, resulted in expanding commercial facilities significantly within some New Jersey communities. A survey of PUD residents in the state has shown that 80 percent do most of their shopping at regional shopping malls, which are frequently at a much greater distance from their homes than the older "downtown" areas or smaller suburban shopping centers [73]. This pattern may be typical of communities with small land areas. A comprehensive methodology to estimate the level of additional commercial activity likely to be generated by new housing is discussed as part of an impact analysis study [2]. A simpler approach is to aggregate total revenue which accrues to a community from commercial development, subtract the direct cost of providing services to commercial facilities, and divide the balance by the number of housing units to obtain net commercial revenue per household. This approach provides a rough measure of the fiscal importance of commercial facilities in the community based on historical residential and commercial development patterns.

Increased Demand for Housing and Services to Households as a Result of Added Industrial Development

Most communities are anxious to attract new industry in anticipation of fiscal surpluses. It is assumed, in most cases correctly, that the cost of providing services such as police and fire protection to a new facility is less than local tax revenues which are likely to accrue to the municipality. Frequently ignored is the fiscal impact caused by industrial development when labor force requirements are not met from the existing labor pool within commuting distance of its location.[31] The resulting level of inmigration attracted into the community with new facilities in comparison to other areas within commuting distance is a function of housing at various price levels, land use controls, and accessibility of the new development to nearby communities.[32]

A study of new industry in Kentucky shows that in six of eight cases examined, the net fiscal impact, due to the inmigration of new households with school-age children, was negative [16]. The communities, located in rural areas, would not have attracted new households in the absence of the industries locating there.

A similar study of rural industrial development in

30. In most communities, newer shopping centers reduce the volume of business in older shopping areas. While this shift has been common from central cities to suburbs, it also takes place within jurisdictions.

31. The proportion of employees commuting among jurisdictions in metropolitan areas can be obtained from the 1970 Census of Population. For an application of these data as part of an economic impact analysis, see: [21].

32. Given high vacancy rates, new housing demand may not be created, but service demand by households will nevertheless increase.

Oklahoma concludes that three new facilities caused a deficit to local government, nine showed a fiscal surplus [22]. However, both deficits and surpluses tended to be small.

An older study which examined new industry in suburban areas shows generally favorable fiscal effects of these developments [18]. The magnitude of positive results was due to relatively few households moving to the communities as a result of industry relocation. This study concludes: "In order to improve their finances, suburban municipalities should seek out and encourage expansion of industries which not only have a high value of assessment per employee but also have employees who are not apt to relocate their residences in the face of an industrial move."

The effects of various industrial sectors on a major local outlay—public schools—have been examined through the use of a model. The application of the model to a metropolitan area shows that expansion of five types of industries would create a fiscal deficit but that expansion of ten other types would generate a surplus to school districts [17].

What primary and secondary fiscal impact can communities anticipate as a result of new industrial development? On the basis of examining studies referenced in this section, the results are somewhat mixed. One of these studies, after noting that considerable private economic benefits (higher wages and salaries) accrue from industrial development, states that "disillusionment awaited communities seeking industry merely to expand their tax base to support schools and municipal services" [22]. Fiscal benefits from new industry in rural areas appear minor, while frequently additional costs exceed revenues, resulting in increased tax burdens for all residents. In the case of industry relocating within metropolitan areas, the fiscal results are likely to be more positive, since the likelihood of inmigration is reduced.

Increased Demand for Housing and Services Resulting from Commercial Development

The secondary effects resulting from the addition of such commercial structures as shopping centers and office buildings have not been the focus of fiscal impact studies. However, studies of household location patterns provide some insight into additional demand for housing likely to be created. In many areas, new shopping center employees relocate from older business centers which are experiencing declining sales. Because of comparatively low wages for sales personnel, and a high proportion of secondary employees (workers other than heads of households), workers tend to be local residents rather than commuters. While national retail chains may transfer some executive personnel, these transfers represent only a fraction of total retail employment. Substantial inmigration and additional housing demand as a direct result of new retail stores is therefore unlikely.

Office building tenants range from high salary professional groups to firms employing large numbers of moderate wage clerical personnel. The number of inmigrants depends on factors noted previously. The proportion of commuters and residents by income, occupation, and sex is shown in a study of highrise office buildings in San Francisco [21]. The study concludes that the type of employment influences the proportion of commuters to the city.

Increased Activity on the Periphery of Development

Major land use changes, such as PUDs and new communities, inevitably create additional development contiguous to their location. This is part of the agglomeration effect noted in many urban studies. Even if unimproved land areas within the boundaries of the new development are sufficiently large to absorb future demand—as in Disney World, Florida and Reston, Virginia—development on the periphery nevertheless appears to take place. This is usually due to controls enforced by the owners and/or residents to preserve the specific character of the development. A shopping center, for example, may exclude "undesirable" discount stores, gas stations, motels, and fast-food stands which then try to locate nearby. This spillover economic activity may include not only retail outlets but also certain types of housing not available within a PUD or new community. There may be a substantial time lag of two to four years between the initial development and development on its periphery. In any event, the fiscal impacts need to be computed.

Public Sector Capital Investments

The previous discussion focused on private sector effects which have fiscal implications. However, large new developments usually trigger a chain of local, state, and federal capital outlays. The largest outlays are for transportation facilities, particularly roads, and for utilities.[33] These outlays, which generally follow growth stimulated by private investments, create their own momentum. For example, highway construction in urban areas follows traffic levels which the existing transportation network cannot absorb. Once the public

33. The major planning tools available to influence the pattern and location of growth remain the placement of water and sewer lines, usually under local control, and the location of major roads, usually a joint local-state decision.

construction is initiated, additional private development is encouraged, particularly near highway intersections and access roads. The addition of new rapid transit facilities can redistribute growth to sites near transit stations. Such redistribution, however, is not likely to have a significant aggregate regional effect.

TIME HORIZON

In most cost-revenue studies, the levels of revenues and expenditures are estimated through the year when the last phase of construction is to be completed, or for an arbitrary period such as ten years. Usually, the base data at the time the analysis is undertaken (for the development and community) are extrapolated for the period selected.[34]

This type of analysis has severe limitations, as revenue and expenditure levels are likely to shift over time according to the type of development and the characteristics of population it attracts. However, since the time span selected for fiscal impact analysis is as much a political as an economic decision, and political pressures tend to reflect short-term effects, there is more interest in next year's tax rates than in tax levels for the following decade.[35] Nevertheless, specific kinds of long-term shifts that are likely to affect revenue and expenditure estimates should be taken into account.

Revenues

Property appreciation (and depreciation in a less inflationary economy) tends to be a long-run effect. There is considerable evidence that the rate of change in property value—which clearly has an impact on the local tax base—varies by type of land use. For example, single-unit detached homes tend to appreciate more rapidly in value than multiple unit structures.[36] This pattern is due, at least in part, to initial differences in the value of land in proportion to the total property value. Since land appreciates at a much more rapid rate than improvements (buildings are likely, in fact, to depreciate in constant dollars), this is a significant factor in explaining why detached housing units appreciate more rapidly than townhouses and multi-unit dwellings [77]. In addition, rental apartment units are generally not maintained as well as owner-occupied property, which has the effect of reducing their value. For these and related reasons, the initial difference in assessed value between single-family homes and apartments is likely to increase over time, a factor which needs to be incorporated into a fiscal analysis.

Investment property, including most apartments, is usually not assessed on the basis of its market value, as is owner-occupied property. Gross rents or net cash flow, in the case of residential property, and gross sales or value of product manufactured, in the case of commercial and industrial property, are frequently used as the basis for tax assessment purposes. These can vary substantially over the long run. Since assessment practices for business property vary widely among communities, few generalizations are possible when long-term revenue estimates are attempted. In general, historical assessment patterns need to be examined for various land uses to project future revenue flows.

An additional factor involved in the long-run projection of revenues from real property is the frequency of reassessment. It appears that many assessors adjust taxes to reflect higher rent receipts more frequently than they respond to the appreciation of single-family units. This may be a result of less concern with the reaction of renters who are not conscious of the linkage between taxes and rent payment levels, and, politically, less concern with apartment dwellers who are not as likely to vote in local elections as people residing in owner-occupied units.

Income-related revenue sources, although not directly linked to real property, may also be imputed from shifts in property value. If housing units are physically deteriorating, the income of their residents is likely to drop relative to the income of people living in otherwise similar but well-maintained housing. Concurrently, if a new development becomes socially desirable, the income of its residents (in constant dollars) will rise over time.

Expenditures

Future expenditure patterns are strongly influenced by shifts in the demographic characteristics of residents. Although data on this issue are limited, it has been shown, for example [27], that in Prince George's County, Maryland the number of children attending public school per unit from apartments increased over time as the proportion of apartment units to all units increased [27]. A study of New Jersey suggests that the number of school children from townhouses increased by 60 percent between the initial date of occupancy of new units and "maturity" of the units [73]. In contrast, a study

34. See, for example: [9].

35. Long-term projections can take into account demographic changes of the population, but are subject to greater uncertainties. These uncertainties include technological changes, life style changes, and shifts in intergovernmental responsibility for public services.

36. Land in suburban areas has been appreciating at 15 percent or more per annum in the last decade, or more rapidly than housing values. However, land is a greater share of residential real property in densely populated Washington, D.C. than in surrounding low-density suburban areas.

of apartments over a ten-year time period in New Jersey [58] indicates that the number of school children per unit has not varied.[37]

Detached housing units seem to follow a more consistent pattern, with more school-age children at the time of initial occupancy. As a moderate income residential development matures, the number of high school students compared to elementary school students will increase.[38] Finally, long-term projections of school enrollment are hazardous, since the birth rate is continuing to decline. If this trend continues, there will be a major readjustment in outlays for primary and secondary education compared to other services.

Per capita costs of local services such as public safety and general government seem to be rising faster over time (in constant dollar terms) than private sector services. This may be due to the lack of increase in public sector productivity.[39] As a result, wage increases, which have been rising rapidly, particularly in large cities, generally are not offset by higher output levels, adding to the difficulty of projecting future costs. Capital costs have also accelerated more rapidly than operating costs in recent years. A community should examine the rate of inflation for construction and anticipated increases in salaries for its municipal employees in projecting long-term fiscal effects of new development.

Life Cycle of Household

If service demands are viewed from the perspective of a household, these vary sharply over its life cycle. As a young household without school children, the family is likely to produce a small fiscal surplus to the community. During the period when the family has one or more children in public schools, it is likely to receive more in services than it pays in taxes. After these children complete their public education, which often coincides with the peak earning years of the family, the same household will produce a substantial surplus to the community.

When this household becomes "senior citizens," its income is reduced. However, property taxes paid by the household tend to remain high (unless exemptions are provided) since it may remain in a housing unit designed for larger families. Costly services to this elderly household, specifically medical and nursing care, are provided by the federal government. Thus, this household may again provide a fiscal surplus to the community.

If this household resided over an extended time period in the same community, with or without intrajurisdictional moves, there would be little need to be concerned if it yielded a fiscal deficit in a particular year. However, there is a tendency within metropolitan areas for households to locate in certain communities at particular stages of their life cycle.[40] This pattern, strongly influenced by the availability of housing that is aimed at particular demographic markets, makes it difficult to apply the life-cycle approach in estimating the impact of new development, except from a regional perspective.

As a result of complexities in projecting costs and revenues in the public sector, further efforts are required to develop knowledge about long-term benefits and losses to a jurisdiction from a development. Until more data are collected on those long-term fiscal effects in growing communities, projections over an extended time horizon are of only limited value.

FISCAL INTERACTIONS AMONG JURISDICTIONS

Since local communities are not closed economies, many activities of individuals, firms and public agencies in adjacent jurisdictions affect the fiscal impact of a new development on a local government. The type and size of the development will have a bearing on the geographic extent and intensity of these spillover effects. For example, additional sales taxes from a new shopping center depend on the consumption level of shoppers from other areas as well as on the increased propensity of local residents to shop within a jurisdiction.[41] Concurrently, development activities in nearby communities have a fiscal spill-in effect. Frequently, a community is affected more by developments beyond its jurisdictional control than by those within its boundaries. A large industrial facility located in a nearby community can accelerate demand for new housing or services, such as transportation. Conversely, the fiscal impact of nonresidential development within the jurisdiction depends, to a considerable degree, on the housing opportunities for new employees outside the community. This explains why certain communities find it desirable to

37. Since the birth rate was reduced over the time span of the analysis, there was an increase in school children compared to detached housing.

38. This results in higher unit costs since per pupil outlays for high school students are about one-third above those for elementary pupils. However, total enrollment will be reduced.

39. For a theoretical discussion of cost increases in the private sector, see: [4

40. The segmented housing market is most visible in Southern California where there is housing for singles, young married families with young children, mature adults, and for the elderly ("leisure" developments).

41. In a closed economy, a new shopping center could result in little net change in tax receipts—only a shift by consumers from older shopping areas to the new center.

attract new industry, but not necessarily new households, since they believe the latter may adversely affect the fiscal surplus from new business enterprises.

Within a metropolitan area, or within suburban communities which have open space remaining, a considerable share of new growth may merely represent a shift of population from the central city to its suburbs or from older to newer suburban areas. Thus, what is fiscally beneficial (or detrimental) to a community may not be necessarily beneficial (or detrimental) from a regional perspective. As noted earlier, one study has shown that a development caused a fiscal deficit at the local level but a surplus at the state level [5]. As the size of geographic areas under study expands, spillover and spill-in effects are reduced. As a result, fiscal impact, viewed from the state or metropolitan perspective, is less sensitive to spillover and spill-in effects than is an analysis that focuses narrowly on local effects.

A new development can cause shifts not only in local revenue and expenditure flows, but also in state revenues and outlays to the local community. Therefore, in order to determine the net fiscal impact of a development on a community, both local and state fiscal flows affected by growth need to be computed. For example, in New Jersey, there is theoretically an equilibrium in state-local education funding: state education aid drops as a result of increases in per pupil property value, but local taxes derived from increased property values are supposed to counteract the loss. Thus, a school district should be fiscally neither better nor worse off by shifts in per pupil property value as a result of new development. However, in actuality, local governments in the state have been receiving only half of the state equalization aid. School districts taxing their own properties are therefore better off than those receiving aid. This enhances the attractiveness of high property value developments to local school districts. Although most states have some form of equalization based on differences in property value, the situation in New Jersey is typical—state aid does not suffice to put districts with low per pupil property value on a par with wealthier districts. Consequently, lower-income housing is discouraged by present state distributional formulas for educational aid.

State distributional formulas for highway construction, mass transit, and other services tend to encourage development in certain areas over others. In most states, low-density rural areas benefit more from highway aid than do growing urban centers.

Fiscal interactions among neighboring jurisdictions and various levels of government should be incorporated into all fiscal impact studies, with special attention to the impact of new development on state aid and federal revenue sharing.

FACTORS WHICH LIMIT THE SCOPE OF FISCAL IMPACT STUDIES

Why do so few studies consider the broader issues of fiscal impact?

Factors which may account for the scant attention these issues have received include the following:

Lack of Conceptual Framework

The impact analyses reviewed are ad hoc, with little attempt to formulate a comprehensive framework showing interdependencies among various effects or to draw on relevant social science disciplines to provide a theoretical construct.

Insufficient Analyses of Empirical Data

Facts about scale economies, preference shifts, and so forth have not been gathered or studied with enough care to demonstrate precisely how these important aspects affect costs and revenues. While differences in the tax structure and expenditure patterns among communities have been examined and reported in the public finance literature, the results have not been widely incorporated into cost-revenue studies.

Shortages of Resources

To undertake cross-sectional studies and household surveys requires considerable resources. Most sponsors are unwilling or unable to provide the level of funding necessary to undertake these large-scale efforts.

Sponsor Objectives

Frequently, the interest of study sponsors is limited to short-term cost-revenue effects. At worst, there may be concern that the results of a more comprehensive analysis would not be in the self-interest of the sponsors; at best, the sponsor's perspective is simply too narrow.

V. IMPLEMENTATION AND USE OF FISCAL IMPACT ANALYSIS

The reader of this report should not conclude, on the basis of the many limitations of fiscal studies reviewed, that estimating the effects of new development in a particular community is not a feasible task.

GUIDELINES FOR INITIATING STUDIES

The sections that follow briefly outline general guidelines for implementing a fiscal impact study, discuss factors to be considered in the selection of developments for analysis, and note some nontechnical issues. Appendix A discusses procedures for undertaking a fiscal impact analysis in more detail.

General Approach

To implement cost-revenue studies of residential developments in communities which do not have detailed data on the cost of new housing, it is first necessary to establish a communitywide data base on revenue sources, capital costs, and operating expenditures for major land use categories. Data on the socioeconomic and demographic characteristics of the present population by housing type and length of residence are also needed. Part of the data on residents is available from the 1970 Census of Population. However, since these data quickly become obsolete, they need to be updated on the basis of local surveys. Two large suburban counties have recently completed such surveys. Montgomery County, Maryland undertook such an update in 1974 by the use of a mail survey [65]. Similarly, Fairfax County, Virginia utilized the state-required school census of households as a means to obtain socioeconomic and demographic data linked to housing type and length of residence in the county.

These communities can compare the characteristics of newer and older residents. In most cases, it is found that residents of new detached housing units have more school-age children, have higher incomes and are somewhat younger than the community average. These kinds of data, in turn, can be used to estimate the likely fiscal impact of these households. These general data need to be followed up by more intensive surveys of new developments with differing housing mixes. For a sample of these households, the consumption level for public services other than schools should be ascertained and compared to service usage levels in older areas of the community. It can be assumed that residents of proposed developments will have service consumption patterns similar to those of residents in newer developments surveyed, if housing characteristics do not differ significantly. The public cost of capital facilities associated with new development, since it can vary substantially by intracommunity location, requires direct estimates from local agencies.

It can usually be assumed initially that the operating cost of providing a *unit of service* (one student attending school, one police department service call) for new residents will be similar to the average cost for all present residents. However, the *quantity of units* (number of school children, or fire calls) utilized per household should be based on data from similar developments. If other analyses undertaken in the community demonstrate significant scale economies or diseconomies as the number of units serviced increases, the incremental unit cost should be adjusted to reflect these differences. As was noted in Chapter 4 (pages 19-33) of this report, there is considerable evidence of scale diseconomies for many services as the size and density of the community in-

creases. The available data suggest, however, that population density (or changes in population characteristics associated with density) appears to be a more important factor in higher per capita costs than population size. Therefore, scale effects should be considered if new developments are projected to significantly change the population density as well as the total population of the community.

To implement studies of commercial and industrial developments, it is first necessary to determine how such property is assessed for tax purposes. In addition, the likely level of other business taxes should be identified.

Public services consumed by these developments, such as public safety and utilities, can be estimated from local agency records.

To estimate secondary effects of industrial and residential employment requires data on the likely number of residents, commuters, and inmigrants to the community which can be directly linked to new facilities. In most cases, it is necessary to survey facilities already constructed to project the likely residence of new employees, their characteristics, and the level of inmigration to the community.

Since all new development is likely to affect the amount of revenue received from the state and federal governments, this factor should be considered when evaluating both residential and nonresidential development.

Routine estimates of fiscal flows associated with small developments which are similar to existing developments can be obtained from expenditure and revenue data for these existing land uses and housing types. While these estimates are likely to differ somewhat from actual fiscal flow, the degree of these deviations is probably not significant.

This discussion has placed emphasis on micro-level data on households and business firms in the community, rather than reliance on estimates from studies of other communities, aggregate data, or the application of community standards to project service costs. Estimates by local officials of likely service demand from new developments should be used to compare their estimates with data obtained from the analysis of household and firm characteristics, rather than as the principal source of information. If major deviations in estimates are evident, the differences should be discussed with local personnel to determine if factors causing estimates of projected demand to differ can be identified. This process can be useful to both the analyst and the official.

The macro-level techniques discussed in this report are more useful in examining the aggregate effects of growth rather than the impact of an individual development. Cross-sectional analysis provides insight into overall revenue and expenditure patterns among communities which have some common attributes, but it cannot reflect the many variables which influence the expenditure patterns in a given community. Data from such analyses can be useful when considering broad alternative growth strategies rather than for estimating the impact of an individual development. Time-series data are also of limited value when projecting the cost of individual new developments.

Econometric models are potentially powerful tools in communitywide cost-revenue analyses. However, further research and testing of existing techniques is required. Staff requirements limit the utility of this approach for most local governments.

When to Implement an Analysis of Individual Developments

The availability of an adequate data base and access to trained personnel are necessary prerequisites for undertaking fiscal analyses. However, since a growing urban area can be expected to have many proposed land use changes, it would be inefficient to undertake a complete—in contrast to a routine—analysis of each proposed development. The political importance of the fiscal issue will determine, in part, the level of effort. The following other factors should be considered in selecting developments for fiscal impact evaluation:

- The degree to which a new development differs, either in the type of housing, density, unit value, or likely population characteristics from the existing housing stock. A small detached-unit development in a predominantly residential community is unlikely to create a fiscal problem. A change in population characteristics, however, can shift service demand from the existing pattern and thus affect aggregate expenditures.
- The number of additional units as a percentage of total housing in the community. If a proposed development is expected to include, say, 15 or 20 percent or more of the total residential housing stock, it could result in fiscal changes even if the type of housing does not deviate from the community average. A development which sharply increases the population of a community is likely to create scale economies and diseconomies which require examination.
- The fiscal effects of new industrial and commercial development, if the household income of the projected labor force will differ substantially from the community average and if inmigration is likely.

If a community initiates an analysis of the environmental or social impacts of a proposed development, at least a rudimentary analysis of the fiscal impacts should also be included. The latter would help provide a more comprehensive view of the effects of the development being considered.

A large community with an established data base should periodically sample smaller new developments to determine whether characteristics of new housing, its residents, and the consumption of public services deviates from previously found patterns. If such deviations are shown, it may require that existing relationships (such as house value to income, school children per bedroom) be adjusted.

Nontechnical Issues

A number of nontechnical questions frequently arise when a community undertakes an impact evaluation. Should incremental one-by-one analysis be undertaken? Are the skills for such an analysis available or obtainable? Should proposal alternatives be considered?

—Urban planners state, with considerable justification, that evaluating the impact of individual projects is not a substitute for land use planning. We recognize, however, that local government is legally required, in many instances, to reach one-by-one decisions on individual parcels of land. The techniques described in this report and in referenced studies can provide the data base necessary to evaluate most fiscal implications associated with alternative comprehensive plans. The fiscal impact of individual residential developments within the boundaries of a comprehensive plan can also be evaluated from this data base.

—A frequently observed problem is that while planning departments have the responsibility for presenting factual data for land use decisions, the line agencies have more technical expertise and access to the necessary information. The staff weakness of most planning departments is particularly evident in economic analysis. Ideally, a member of the planning staff should be an economist with a background in public finance and urban economics. In all but very large departments one person can be responsible for economic analysis. A less effective alternative is to establish links with a nearby university or private firm for periodic assistance.

—Should an impact evaluation estimate the effect of the development being proposed in comparison to no land use change, or to the most likely alternative land use if the proposal is not accepted? If local government has the option to reject or modify both the proposal under consideration and the most likely alternative, then the anticipated results of no change in land use should be used as a comparison. However, if local government has control over the proposal being considered but not the most likely alternative, the approach should differ. For example, a new shopping center proposal may depend on the grant of a rezoning from moderate density residential to commercial land use. If rezoning is not granted, one can anticipate that townhouses, allowed under present zoning, will be built. In this situation, it is advisable that the fiscal and other impacts of townhouses be compared with the shopping center impacts.

—Local government should, in some cases, consider the fiscal and other effects of alternative development patterns, particularly at the area plan level. Many communities have adopted policies to provide a broad spectrum of housing to meet the needs of present and future residents. To meet this objective, it is useful to determine the pattern of growth which can provide housing that reflects the preferences and ability to pay of various population groups and that can make such housing available at the lowest possible public and private costs.

—Local officials, planners and interested citizens should also be aware of issues associated with fiscal impact studies, such as scale and income distribution effects of development which have been discussed in this report.

PRESENT USES AND POTENTIAL MISUSES

From a policy perspective, the importance of cost-revenue or fiscal impact studies lies not in their methodological niceties or theoretical symmetry, but rather in the ways they are used or misused in the land use decision process.

It would be unrealistic to expect local officials to accept study findings about fiscal effects out of context, without reference to other development effects. For example, the kinds of neighborhoods and new development that present residents want to encourage may be given more weight than purely fiscal considerations. In New Jersey, many communities restrict or severely limit the number of apartments that can be built, although most local officials recognize that a favorable fiscal impact would result from new multifamily dwellings, particularly highrise apartments. They limit such development because of the opposition of residents, most of whom live in single-family units and wish to maintain a homogeneous community.[1]

1. The views of residents and community leaders on perceived fiscal and social effects of apartments are discussed in [19]. The importance attached by both residents and the courts to maintaining a homogeneous community is reflected in the recent Supreme Court ruling on the constitutionality of a single-family dwelling ordinance in Belle Terre, New York.

To elected officials, one crucial fact about potential residents who are being excluded is that they cannot vote.

Officials at other times may use fiscal findings as a kind of shield if there is opposition to a particular type of housing and the type of people who are likely to occupy it: if a study can project a possible fiscal deficit, this economic factor rather than the more fundamental exclusionary sentiment will be cited as a cause for rejection of the development.

The local officials and planners who review fiscal impact studies must first evaluate the results from the community's rather than the study sponsor's perspective. Then, if negative fiscal effects are projected, they must determine whether there are other development options that could offset such effects.

The new development options facing local officials vary considerably, depending on the current stability and strength of the community's treasury. The options clearly are related also to the jurisdiction's present surplus or deficit of capital facilities. Communities that have been forced to raise tax rates because of a sharp rise in school enrollment, for example, are anxious to expand their tax base by attracting fiscally beneficial commercial and industrial development. Similarly, communities with considerable outmigration, and thus with underutilized public facilities, are also eager to attract development; stagnating communities, as compared to growing communities, are more likely to show a fiscal surplus from additions of new households.

In affluent communities and those anxious to maintain what they perceive to be an advantageous life style, new development may be rejected even though its fiscal benefits can be demonstrated. Even in these communities, prodevelopment arguments are more persuasive if accompanied by a projection of fiscal surplus. However, when new development poses what residents consider to be a social threat, certain forms of development are frequently restricted by the use of zoning or other means.

Alternative Options for Dealing with Expectations of Fiscal Deficits

Assuming that fiscal factors are of considerable importance to most communities, what options are available if studies indicate a deficit from new development? One alternative, of course, is to reject the application outright.[2] This, even if legally permissible, is a severe action. It is more likely that one of the following options will be considered:

- The development may be accepted as is. One premise for following this option is that the deficit will be offset by surpluses from other developments. Or it may be accepted on the basis that nonfiscal social benefits outweigh the fiscal deficits.
- The developer may be required to modify the proposal by changes in the housing mix or nonhousing land uses. For example, if a study shows that three-bedroom apartments (in contrast to one-bedroom units) cause a deficit, he could reduce the number of such units. Alternatively, nonresidential facilities can be added or expanded.
- A payment may be required from the developer to the community for units projected to cause a deficit. Such payments can be used to defray capital outlays linked to the development. For operating outlays likely to cause a deficit, services could be priced in the form of user charges which reflect the incremental cost of the service. This approach has been suggested as a means of discouraging growth in previously undeveloped urban fringe areas [23].
- The proposed development may be required to change its location to an area which has underutilized public facilities to reduce capital outlays.
- The level of public services may be reduced to maintain the existing tax structure and rates.
- The local tax structure may be revised in a way that can turn public deficits from new development into a public surplus.

The position taken by the community regarding these alternatives depends on many variables, including its concern over social issues, its wealth, the need for housing for its residents, and overall economic stability.

If a community anticipates future commercial or industrial developments, it can accept deficit-causing housing on the premise that the surplus from nonresidential development will offset the residential deficit. The provision of subsidized housing can be justified on its social rather than fiscal merits. A fiscal deficit can also be justified if the new economic activity will substantially decrease local unemployment. Thus, residents may be willing to increase their tax contribution to maintain present levels of service or subsidize new firms if there are private sector benefits which contribute significantly to the general welfare.

The second option, such as changing the housing

2. In some communities, no reason has to be cited for rejecting an application to rezone. Thus, fiscal deficit could be the determining factor without an explicit statement to that effect.

mix, is likely to reduce housing opportunities in the development for moderate-income families, particularly larger families, and this has adverse social effects. A less restrictive approach is to modify the originally proposed land use mix to include more commercial and industrial development, offsetting the negative fiscal flow from residential units. Such arrangements are part of the approval process for PUDs (planned unit developments) in New Jersey [10]. A similar approach is now required by St. Charles County, Maryland for the expansion of St. Charles' new community [66]. The long-term fiscal and the other effects of these policies have not been evaluated. However, the experience in New Jersey points to the difficulty of attracting nonresidential development to PUDs.

The third option—requiring payments to the community by the developer—is a practice being adopted by a number of jurisdictions. The legality of such requirements has been questioned. On the basis of some court decisions it appears that such charges can be imposed if the benefits from the use of those charges accrue directly to the new residents. For example, if funds are to be used for the construction of a new elementary school attended by the children of the new residents, the charge can be imposed.[3]

The effects of these charges are difficult to estimate, although it is thought that the developer passes on at least part of the cost directly to the purchaser or renter. To the extent that the required charges would lead to a reduction in the cost of land to the developer, the charge would not be passed on to consumers.[4] If part of the cost is absorbed by the consumer, moderate-income households will be adversely affected.

The fourth option—a change in location for the development—can represent a substantial saving in capital outlay [28]. However, the option is unlikely to be tenable because of differences in land costs and housing demand by location, the difficulties of assembling large tracts of land in more developed parts of the community, and the loss the developer may incur on the land already purchased.

The next alternative—reducing the level of public services—does not appear politically acceptable in most communities. The general response (with some notable exceptions) has been to increase tax rates rather than to reduce public services.

Surprisingly little authoritative work has been done on the reform of property taxes, commuter taxes, and local income taxes as these relate to development. The Minneapolis-St. Paul metropolitan area has adopted a system of tax base sharing to help spread the benefits of nonresidential growth more equally among the various jurisdictions and to minimize the pressures for exclusionary and fiscal zoning. Several important studies underway should also shed more light on this option.

Other options for constraining or limiting development have been challenged in court. Policies which impose a total limit on population or unreasonably delay approval for new development may be open to challenge on constitutional grounds. A discussion of these legal issues is, however, beyond the scope of this study.

3. There may be differences in court decisions among states. However, the practice of requiring developers to deed some of their land for highway rights-of-way, schools, and parks, for example, is widely accepted.

4. The value of the land to the initial owner is reduced since his net income is lower as a result of the charge. Subsequent owners who purchase the property do so at a lower price and are not burdened with the charge.

VI. SUMMARY–STUDY FINDINGS

EXPANDING USES OF FISCAL IMPACT STUDIES

The major use of the fiscal impact studies that were reviewed has been to help local officials determine whether there was likely to be a surplus or deficit to their community as a result of new development.

A second use of these studies has been to help planners and policy makers formulate broad communitywide growth strategies. A number of other potentially valuable uses are also emerging. These include, for example, comprehensive land use planning and capital improvement planning.

Cost-revenue studies are being undertaken to examine the fiscal impact of communitywide alternative development patterns. Previous studies were concerned primarily with the impact of density on capital outlays. However, communities are now undertaking studies which will estimate the aggregate number of inmigrants for each alternative plan along with their socioeconomic and demographic characteristics. Given these population data and the anticipated level of nonresidential development, revenues, capital outlays, and operating outlays can be estimated. The results will indicate which development pattern is most acceptable from a fiscal perspective. This information, combined with projected nonfiscal effects, will provide local decision makers with implications of alternative growth strategies.

A more modest use of fiscal impact studies is related to capital improvement programs. The size, location, and timing of new facilities is linked to the level of anticipated demand. Concurrently, the timing and location of private development is based, to a considerable degree, on the availability of public facilities. Public and private planning should be integrated in such a manner that the revenue flow—estimated from fiscal studies—can cover projected public capital and operating outlays.

Fiscal impact studies which examine service pricing alternatives associated with new development are attracting considerable interest. Some of these studies are aimed at determining whether present pricing mechanisms result in subsidies to new development from older areas of a community.[1]

METHODOLOGIES—STATE OF THE ART

Techniques applied in studies reviewed range from simple, one-dimensional methods to complex econometric models. The determination of which technique to select depends on study objectives and available resources. However, since there are only limited data available based on retrospective analysis, the reliability of techniques reviewed have not yet been adequately assessed.

Given the limited state of knowledge, the most effective approach is to estimate, directly by the use of surveys or indirectly from secondary sources, the likely demographic and income characteristics of new residents by type of housing. These data can be applied to estimate both revenues expected to accrue and anticipated demand for public services.

To examine the fiscal impact of alternative growth patterns or development in general, it is useful to apply time series data from the same community or cross-sectional data from similar jurisdictions. It is essential that likely incremental costs for new households be de-

1. The National Science Foundation is presently funding an effort by the Center for Urban and Regional Studies at Virginia Polytechnic Institute to examine service pricing alternatives in growing suburbs.

termined. The emphasis should be on empirical data from similar development rather than on simulated values.

WHY FINDINGS MAY BE INCONSISTENT

A major factor which explains inconsistencies in results from one study to another is the objective of the sponsor, which affects the scope of the analysis, the inital assumptions and, in some cases, the techniques selected. The conclusions of studies sponsored by private developers frequently differ from those sponsored by nonprofit organizations or the public sector.

Differences in allocation of service costs among land uses and between new development and the balance of the community can also affect findings.

Yet, even if the same initial assumptions are made and the same techniques are applied to similar developments in different locations, results may vary between locations because of variations in state-local fiscal structures. Intracommunity location of new development, because of differences in infrastructure required and other causes, also affects public outlays and thus the fiscal flow associated with a particular development.

FISCAL IMPACT OF DIFFERENT DEVELOPMENT TYPES

Most new *detached housing* developments, particularly during the 1960s, produced more revenues in comparison with the existing housing stock. During this decade, the average square footage of new housing, and thus the selling price in constant dollars, increased substantially. Many of the new residents in suburbs, where most new development has taken place, were higher-income outmigrants from central cities or migrants with above-average income from other metropolitan areas. Their property and other tax payments exceeded that of the base population. Concurrently, their consumption of services, particularly education, also exceeded the community average. Thus, both revenues and expenditures from new detached housing have been above the level of older housing.

Garden apartments frequently create a surplus because of the low number of school-age children compared to those in detached housing. In communities where these apartments create a fiscal deficit, it is usually smaller than the deficit from single-family units. High-rise privately-sponsored *apartments* and *condominiums* are usually aimed at young professionals and the elderly. Since these groups are unlikely to have school-age children, surpluses are consistently shown.

Commercial developments, such as shopping centers, create a fiscal surplus since they are unlikely to attract many inmigrants. However, new shopping centers frequently reflect a shift in the location of retail activity rather than increased aggregate sales, offsetting part of the surplus. Office buildings, particularly those utilized by professional groups, are likely to provide more revenues than the cost of services consumed.

Industrial developments are found to have a mixed effect when secondary impacts, particularly inmigration, are considered. Capital intensive facilities with high-salaried employees provide more revenue than the cost of services, while labor intensive facilities with wages close to or below the community average cause a deficit.

The above discussion focuses on individual developments. At the aggregate, community level, a balanced budget implies that residential developments collectively will produce a deficit. This deficit is offset by nonresidential land uses—industrial, commercial, or agricultural. Surpluses or deficits from any one development are absorbed among all property by adjustments to the tax rate or changes in outlays for public services.

FISCAL IMPACT ANALYSIS—LOOKING TO THE FUTURE

Growth theories and analytic techniques have not been sufficiently developed to incorporate consideration of some issues which can have a major long-term fiscal effect.

Effects of Increasing Population Size and Density

There is substantial evidence that there are diseconomies of scale for many services provided by the public sector when the size and density of a community reaches a threshold level which is at some point below 100,000 residents. Private benefits in larger areas probably offset increased public costs, but the percentage of income allocated for public services is higher in large urban areas compared to smaller communities. However, a reduction in population and density due to outmigration can create even greater diseconomies. The cumulative fiscal effects of many one-by-one decisions have not been sufficiently evaluated to reach conclusions regarding long-term fiscal impacts.

Tax and Service Preferences

The preferences for both tax and service "packages" change as a community grows from a rural to urban stage. This is linked to changes in population characteristics of new residents and to physical changes, such as higher density, which make it more efficient to have the public sector provide additional services. Therefore, fiscal data gathered prior to those changes is un-

likely to be appropriate for estimating current costs and revenues.

Spatial and Income Distribution Effects

The impact of residential development whose mix of housing differs from the community pattern does not significantly change the aggregate regional demand for services, since regional migration patterns are not significantly affected. Thus, service demand is redistributed rather than altered within the region or, in some cases, within the jurisdiction. The income distribution of residents can be affected by shifts in tax and service preferences.

Secondary Impacts

In addition to direct effects of development, a variety of secondary impacts or chain reactions need to be considered. The linkage between the primary impact of new industry, the subsequent demand for additional housing, and the need to expand public services for new residents are part of this process.

AREAS FOR FURTHER STUDY

Relatively little attention has been given to fiscal implications of certain specific kinds of development, or to the fiscal effects of development from a central city and regional perspective. Such topics that require further study are discussed briefly below.

Industrial Developments

Despite large-scale efforts on the part of many communities and states to attract new industry, the fiscal implications of adding industrial facilities have not been thoroughly investigated. Specifically, the linkages between new industrial facilities and changes in income, demand for new housing, the costs of providing services to industry and additional households, and the additional revenues generated, particularly in metropolitan areas, require additional explanation. A comparision between the fiscal impact of attracting new industry on central cities and on their suburbs would also be particularly useful.

Pattern of Development

A number of studies referenced in this paper have noted the fiscal impact of alternative development patterns. However, these studies are restricted by assumptions which may not be valid. While it is often assumed that there are differences in both capital and operating expenditures related to a particular pattern of development, little empirical data have been collected to demonstrate the validity of the simulated expenditure levels used. More comprehensive studies could contribute significantly to this issue of both local and national interest.

Redevelopment Projects

Almost all fiscal impact studies to date involve communities growing in population and expanding in general economic activity or large developments on the periphery of urban centers. This is a reflection of the concern by residents of such communities that rapid expansion may have adverse effects. It also reflects growth pressures as a result of outmigration from central cities and inner suburbs, as well as interregional migration.

Central cities, however, also have the capacity to absorb a considerable amount of growth by redevelopment, rehabilitation of existing structures, and other mechanisms. Since, as has been suggested, the fiscal impact of a given household varies by its location within an urban area, the extent of the comparative fiscal benefit which results from a household locating in a rehabilitated structure in a central city rather than in a new unit in a suburban area should be explored. The cost-revenue approaches will require some modification in cases where urban redevelopment is to be financed by both private and public funds.

Retrospective Evaluation of New Communities, PUDs, and Large Developments

A number of new communities, PUDs, and large developments for which initial fiscal impact studies had been undertaken have now been completed for a number of years. These communities offer a potentially large data base that could be used in studies to determine whether prior predictions of impact were realistic. The data also could be used in developing a model for future evaluations.

These developments would be examined at the micro level to estimate changes in the characteristics of the occupants by type of housing unit over time. For example, one would examine a detached housing development built in 1968, estimate (from mortgage company records or fiscal studies) the demographic and socioeconomic characteristics of its original residents and the original property value, and compare this information to the characteristics of present residents and current property values. Similarly, the change in composition and property value of commercial development centers over time would be examined.

The examination of changes in household characteristics within one or more large developments should be parallel with a review of changes in public service outlays, public employee personnel, and service output measures for selected functions during the same time period.

Regional Studies

A fiscal impact study of selected metropolitan regions should be aimed at determining differences in revenues and public services among communities of different sizes and growth rates. The foundation for such an effort already exists in previous research. The emphasis of such a study would be the choice of communities by residents, the fiscal implications of these decisions on communities, and the most efficient location of new households within the community or region from the public service cost perspective.

Another useful kind of regional study involves determining the fiscal impact of constraining development in one community on surrounding jurisdictions. As communities adopt various explicit measures to control growth, in addition to implicit controls by zoning, it has become more and more important to understand the fiscal implications of such policies on the surrounding region.

Policy Effects of Fiscal Impact Studies

Although considerable sums of money are allocated by both the public and private sector for fiscal impact studies, it is not known what influence these studies have on land use decisions. A follow-up of selected publicly and privately sponsored studies undertaken to aid in the land use decision process would be useful to determine their effect, if any, on that decision process.

BIBLIOGRAPHY

This is a partially annotated bibliography of works dealing with the fiscal impact of land development. It is divided into the following categories:

A. General methodologies

B. Case studies of individual developments

C. Similar developments in several locations

D. Communitywide studies

E. Regional studies

F. Fiscal impact of alternative development patterns

G. Studies examining demand for and cost of public services

H. Other referenced studies

I. Other bibliographies

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APPENDIX A. MEASURING FISCAL IMPACT – A GENERAL APPROACH

Appendix A outlines a general approach to obtaining data on net changes in government fiscal flow as a result of new development. Part I is extracted from the Urban Institute report, *Measuring Impacts of Land Development* [83]. Part II provides brief comments on other reports which illustrate various approaches to cost-revenue analysis.

I. ESTIMATING NET CHANGES IN GOVERNMENT FISCAL FLOW

A new development's fiscal impact on local government—the net change in public revenues less operating expenditures and (annualized) capital expenditures—depends to a considerable extent on whether the government will maintain or change its level and quality of services to the new development and to the rest of the community after the development is completed. Concurrently, the level of service to be provided is likely to depend to some extent on the estimated fiscal impacts. That is, the community chooses a level of service based in part on its perception of what it can afford. To further complicate matters, maintaining the same expenditures per capita is not necessarily synonymous with maintaining the same quality of service, since the demands for services and the costs of supplying them may change faster or slower than the rate of residental or business population growth.

The methodology discussed here for assessing fiscal impacts is based on the assumption that current service quality, tax structure, and tax rates are to be maintained. The discussion focuses on evaluating proposed residential development.

Retrospective analysis would use similar techniques but would have much better estimates for the socioeconomic and demographic characteristics of the population of the development, the public services allocated to the development, and so forth.

Some of the major direct fiscal impacts of commercial and industrial development are discussed, but not the secondary fiscal effects, such as those resulting from the inmigration, commuting, and shopping they stimulate.

A detailed case study illustrating the procedures for estimating fiscal impact has been developed by Muller and Dawson elsewhere [5].*

Revenue Estimates

Local revenues can be grouped into four categories: (1) revenues associated with real property wealth—the largest source in most jurisdictions; (2) revenues associated with income and level of consumption, which are comprised primarily of local income, sales, and utility taxes; (3) per capita, per pupil, or other per "population unit" revenues, which are derived from either a per capita tax, or redistribution from higher levels of government; and (4) miscellaneous revenues, which include fees, user charges, fines, licenses, and minor items.

It is useful to identify separately the revenues from business enterprises and revenues from households; and the latter should be further classified as occupants of single family, townhouse, and apartment units.

Revenues Related to Real Property

Real property is usually taxed by local governments. In general, the same tax rate applies to both residential and nonresidential property.[1]

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* Numbers in brackets refer to material listed in the Bibliography preceding this appendix.

1. There are exceptions, as in Minnesota, where industrial and commercial property are taxed at a higher rate than residential property.

Property tax revenues are computed by multiplying the tax rate by the assessed value of property. In most communities, the assessed property value is a percentage of market or full property value. For example, in California, assessments are based on 25 percent of market value. Thus, a $50,000 housing unit should be assessed at $12,500. In most cases, however, there is a difference between the "official" and actual current market value, due to a time lag in updating assessments in an inflationary economy and to other factors. The true "effective tax rate," which should be the basis for estimating additional revenue from new real property, can be computed by dividing the current market value of similar property in the community (estimated from recent real estate sales) by tax payments from the property. The effective tax rate, with few exceptions, is below the official rate. The average effective assessment ratio in California during 1971, as shown in the *1972 Census of Government*, was 20 percent of market value, not the 25 percent ratio required by state legislation. Thus an official or nominal tax rate of $15 per $100 of assessed value, for instance, would amount to a 3 percent effective tax rate, not 3.75 percent as one might assume from use of the official assessment ratio.

The estimated market value of land and structures is usually provided by the developer. It can be compared to values of similar property to determine if it reasonably reflects the local market. The property tax revenues may then be estimated by multiplying the estimated market value of the new real property by the effective tax rate, deducting for exemptions such as homestead, old age-low income, or veteran status. Real property taxes from the current (before development) land use on the development site should be computed and subtracted from the estimated revenue accruing from the proposed development to yield the net change in real property taxes. This is too often neglected in fiscal analysis. Likewise, if the people or businesses displaced by the development leave the jurisdiction, estimates of other tax revenues lost—and expenditures reduced—may be needed.

For income-producing property, such as a large apartment building, property taxes might not be based on the value of the building, but rather on gross or net income. This assessment approach tends to result in higher revenues compared to taxes on the value of the building, unless many units are not occupied.

Changes in property tax revenue may also result if new development induces changes in land values elsewhere in the community. Although such estimates are very difficult to quantify with much confidence, to the extent they can be approximated the associated revenues should be accounted for.

Revenues Related to Income

Revenues generated by new development may be directly related to income of residents as with local income taxes. Or they may be indirectly related via consumption as with personal property taxes and local sales taxes. A number of communities impose utility taxes related to income insofar as higher income households have larger housing units and more appliances, and thus consume more energy and water. Excise taxes on specific goods also relate to consumption patterns.

To estimate these income-related taxes, it is necessary to estimate the expected household income of new residents, which may be derived from the relationships, between property values and income. These relationships, in turn, can be determined from census data and consumer surveys.[2]

If monthly rent payments for proposed apartment units have been set, income estimates can be derived by assuming rent payments to be a specified share of income.[3] The share of income allocated for housing varies somewhat by location, age, and size of the household, and by type of housing. Annual rental payments also may be estimated as representing, on the average, between one-seventh to one-ninth of the value of the housing unit.

A more direct method for estimating income of new residents is to examine applications to mortgage institutions, developers, and apartment managers. However, access to these data is extremely difficult because of confidentiality.

Sales and excise tax recipts can be estimated—given data on income—from various surveys on expenditures by income class, household size, region, and metropolitan area.[4]

Income taxes can be estimated directly by application of appropriate rates to taxable income and size of household. In a few states, local governments can impose a tax on income of residents, or a tax on payrolls, based on place of employment. Many cities in Pennsylvania and Ohio tax income earned in the community. In Maryland, all counties levy an income tax on residents

2. For a discussion of the demand for housing as a function of income, see F. deLeeuw, "The Demand for Housing: A Review of Cross Section Evidence," *The Review of Economics and Statistics*, Vol. 53, February 1971, pp. 1-10. He found that the value of the new owner-occupied housing was generally between 1.7 and 2.4 times annual income.

3. A number of government publications discuss these proportions. For example, see U.S. Department of Labor, *Three Standards of Living for Urban Families*, Bulletin No. 1570-5, Washington, D.C., 1969.

4. U.S. Department of Labor, Bureau of Labor Statistics, *Survey of Consumer Expenditures*, Report No. 237-88. Washington, D.C., 1965.

of their jurisdiction. In some states, these local income or payroll taxes are not permitted.

Personal property subject to taxation varies widely. The most common items subject to this tax are automobiles and, to a lesser extent, major household goods. Their value can be estimated by their relation to income.[5] In the case of automobiles, it is necessary to ascertain the base used for estimating value (wholesale price, loan value, or market price) and the effective tax rate. Businesses sometimes must pay personal property taxes based on machinery and inventory; these can be roughly estimated if the type of proposed industry is known.

Utility taxes are frequently levied as a percentage of utility bills. Estimates of average bills can be based on utility company data for various types of residences, such as large single-family dwellings, smaller single-family dwellings, and apartments.

Per Capita Revenues

Local governments in some states administer a per capita or "head" tax on all adults. More frequently, local government is the recipient of state or county revenues distributed on the basis of the number of residents or the number of students. For example, profits from the alcoholic beverage sales by the state are distributed to local jurisdictions in Virginia based on population, while sales tax receipts are distributed on the basis of school-age residents. Federal revenue sharing for local jurisdictions, as presently legislated, also uses population as one criterion. (The other criteria are per capita income and tax effort; as income in a community rises relative to other jurisdictions, revenue sharing funds are reduced; an increase in relative tax effort leads to an increase in the federal funds.) Estimates of all per capita taxes should be based on the expected change in local population or school enrollment, applying whatever formulas are used for computing such taxes.

User Charges, Service Fees, Miscellaneous Revenues

User charges for utility services, other revenues from public utility operations, and fees for public safety, recreational, and other services also can provide substantial revenue to local government [76]. Such user charges, fees, and fines initially should be allocated between business firms and households. The revenues accruing from households can be approximated on the basis of recent per capita receipts from these sources by the jurisdiction.

Operating Expenditure Estimates

The importance and scope of local public services for which expenditures must be estimated can differ sharply among and within states. For example, water and sewage utilities and roads and highways are maintained by many localities but not others. Health and welfare often are not city responsibilities, and tend to be small portions of some county budgets. However, they are major expenditure items in cities such as New York or Detroit and in many counties.

The allocation techniques discussed here assume that current local government personnel (teachers, maintenance crews) generally are fully occupied. Thus, a new development that creates additional demand for their services would, in the absence of additional resources, reduce the quality of services. The allocation techniques estimate the cost of maintaining the existing scope and quality of services. The attempt to determine average costs or additional costs for each service, if they can be determined, will be very useful for determining the impacts of new development. It is recognized, however, that existing personel may be underutilized because of inefficiencies, anticipation of future demand, or other reasons, in which cases judgmental adjustments in operating expenditure estimates would have to be made.

Local operating expenditures can be grouped into those incurred in supplying services used (1) primarily by households, such as education, libraries, health and welfare, and recreation, and those used (2) by both business enterprises and households, such as fire and police, utilities, general government, and transportation.

Household-Related Expenditures—Education

In most local jurisdictions, public education is the largest outlay, as high as 80 percent of operating expenditures in suburban areas of states in which the state governments do not absorb the major share of these burdens. Therefore, the factor which usually determines whether a residential development will result in a fiscal surplus or liability is the projected incremental expenditure for public education.

The two most important factors which determine school enrollment and therefore education expenditures are the type of housing and number of bedrooms per housing unit. A number of studies show how to estimate enrollment on the basis of these two factors [27, 58]. With few exceptions, detached single-family housing units, particularly those with four or more bedrooms, and garden apartments with three bedrooms, have the

5. For data on the relationship between automobile value and personal income, see the most current issue, Bureau of the Census, *Consumer Buying Indicators*, Series P-65, Washington, D.C.

most school-age children per unit. New detached housing units typically have more children than do older units. The fewest children per unit are found in highrise luxury apartments and condominiums, one-bedroom garden apartments, and two-bedroom townhouses.

In addition to housing type, racial and ethnic characteristics, which are related to children per family and reliance on parochial schools, also influence public school enrollment. Income, which is related to housing type, affects both the demand for higher quality educational services and the reliance on private schools and thus affects public school population and budget.

The distribution of students among grade levels is frequently also a function of housing type. Apartment residents tend to have proportionately more children in elementary grades, where per pupil costs are up to one-third lower than in higher grades. The use of average per student expenditure throughout the school district, without reference to these differences in grade level distribution for each housing type, is likely to be misleading.

Statistics on children per unit considering the various factors just cited can be developed from school attendance records for the community or similar communities, if they are not already available from the school board. The estimated number of new students per grade times the average cost per student in each grade yields the total estimated educational expenditure.

In communities which support junior colleges and other post-high school education, the impact of new developments on these facilities also needs to be estimated. Enrollment in such institutions is a function of household demographic characteristics and income.

In most states the level of state aid for public education is based, at least in part, on per pupil property values. Thus, a proposed commercial, industrial, or expensive residential development will increase the per pupil property base, decreasing the per pupil state contribution in the future.

Household-Related Expenditures—Noneducational Services

One simplistic approach to estimating additional noneducational expenditures associated with new households is to assume that the cost per new resident will equal the average cost of these services per existing resident. This easy computation is based on the premise that (1) demand is independent of socioeconomic and demographic characteristics, or that (2) population characteristics of new residents are similar to the base population. It also implies that the unit cost of delivering Numerous studies suggest that these assumptions are questionable [34]. Characteristics of inmigrants generally differ from those of the base population.[6] The type and unit value of housing can be used to estimate resident characteristics, especially income distribution.

Some of the complexities to be taken into account for improved estimates of noneducational expenditures are discussed in the sections that follow. Cost situations vary too widely from community to community to permit more than a general approach here.

Health and welfare. Most health and welfare services are directly linked to income. These expenditures tend to be concentrated in older, lower-income areas of a jurisdiction. Since the income of residents in new nonsubsidized housing can be expected to be considerably above the level that would qualify for welfare and health services for the indigent, the demand and thus the incremental cost of social services is likely to be low.

To assess the impact of new residents on social services, the proportion of new households whose income or age is at a level which qualifies for social services should be estimated. In addition, the cost of health services available to all residents, regardless of income, should be computed. As population increases, it also may be assumed that the unit cost of social services will rise somewhat, because the cost of living and wages generally are higher in larger communities than in smaller ones.

Recreation and libraries. The demand for certain recreation and library facilities may increase with the inmigration of higher income residents. Concurrently, new developments may provide their private facilities, reducing the pressure on public services. Some communities plan for a fixed quantity of recreation facilities and open space per capita regardless of private facilities.

Preferably, the additional demand for recreational facilities as a function of age, income, and location of residents should be used to estimate new recreation operating expenditures, modified by special circumstances and characteristics of local policy. In the absence of such data, or, if the policy is equal allocation per capita, the current average cost per household should be allocated to the new development.

Services Utilized Jointly by Households and Businesses

Most local services are utilized by both households and business enterprises. As in the case of the household-related services, it is preferable to base cost estimates on actual service additions that can be attributed to the new development. Where circumstances do not allow this, estimates may be based on past expenditures

6. Characteristics of inmigrants to large urban areas can be estimated from Bureau of Census *Mobility of Metropolitan Areas*, PC(2)-2c, Washington, D.C., 1973.

per household, per business employee, or per $1,000 property value.

As a first step for estimating these unit costs, it is useful to identify past expenditures for each sector—households and business.[7] In some communities, business enterprises are concentrated in areas with few residential structures, and the services devoted to them may be readily identified. For example, a fire company may serve primarily a central business district, so that all or a large share of that cost can be allocated to business.

In expanding areas, new commercial and perhaps industrial property may be in fairly close proximity to housing, making it difficult to identify the actual resources supplied for each. Several allocation schemes have been devised. The most commonly utilized method is to allocate expenditures for jointly used services—particularly public safety—to busines and residences in proportion to their relative property value. An alternative is to rely on the number of employees in business enterprises, as a proportion of total employees and residents, for the allocation to business [38]. Both of these approaches, however, tend to reflect benefit received rather than cost incurred. Where demand data are available, these may be used as the basis of allocation. For example, the number of fire calls associated with business versus the total calls could be used for allocating fire services. The proportion of trips generated by residences versus businesses could be used for allocating local transportation services.

Some services are aimed directly at the business sector, such as the testing and sealing of scales. Their costs should be fully allocated to business, even though some benefits may accrue to the residents.

Once historical costs are allocated between business and residences, unit costs can be computed and used for estimating expenditures for new development. Some further comments on estimating costs of the major jointly used services follow.

General government. It is difficult to allocate most general government services to a specific development. For small developments, general expenditures can be estimated on a per capita basis.

However, as the community grows, per capita expenditures for general services tend to increase. A wider scope of services is offered, and more highly trained and paid professionals are hired. For large-scale developments, using past per capita costs may thus underestimate the incremental expenditure. The actual allocation should reflect the experience of similar communities in the state which have been growing rapidly in comparison to those where growth has been small. This method of estimating the future cost of services has been applied to a number of communities [58].

Fire services. The need for additional fire service expenditures is determined by the accessibility of new developments to existing fire stations, the current demand level at those stations, and the types of proposed structures.

The frequency of fires per housing unit in new residential developments, based on empirical data, is usually below community averages. However, low density development can require more fire stations per housing unit to offset the longer travel times when housing is spread out. And despite locational differences, certain communities maintain a fixed relationship between firemen and population.[8]

The suggested approach is to allocate incremental operating outlays for fire services on the basis of additional manpower required. If no added personnel are needed, one can estimate the anticipated number of additional fire calls as a proportion of the total number of calls for the fire station nearest the development. This would indicate the share of the fire station operating cost to be allocated to the new development.

Police services. Per capita police outlays, once some minimum population base is reached, increase as the size of a city increases. It is not known to what extent this is attributable to changes in the level and types of police service provided, socioeconomic characteristics, population density, or other factors. The major factor appears to be the higher level of crime per capita.

New developments characterized in the main by low density housing are likely to have low crime rates.[9] Insofar as crime rates reflect direct demand for police services, the use of a crime index as a proxy for demand is likely to show that the incremental cost in new developments is below the average cost of providing service. Thus using average costs might seem biased. However, police protection extends to roads, shopping areas, and other facilities where residents shop and work. In addition, only a small share of total police calls are directly linked to crimes. Thus average costs may not be as poor a proxy as one might think at first.

Another approach is to base costs on the estimated additional manpower allocated to the new area, adding a proportional share of central administrative and re-

7. A frequent mistake in cost-revenue analysis is to compute per capita (resident) costs by dividing total costs (for businesses and residents) by the number of residents, rather than dividing just the resident-related part of the costs by the number of residents.

8. In communities within Santa Clara County, for example, a ratio of one fireman per 1000 residents is maintained [80].

9. See, for example: [24 and 27].

lated overhead expenditures. Some communities apply a standard, such as 1.6 uniformed police per 1,000 residents. This implicitly assumes that demand for police services is independent of new population characteristics or the housing mix. It also deals with the development alone, not reflecting its contribution to the higher per capita costs associated with larger communities.

The preferred but somewhat more difficult approach is to estimate the additional manpower likely to be added, based on past experience with similar developments, if any, and discussions with police officials, so that the latest policies can be reflected. To the costs of manpower necessary to serve the new development would be added expected increases in general costs due to the community's increased population, based on experience in other like communities.

Capital Expenditure Estimates

Three major tasks are involved in estimating the costs of public capital improvements associated with new development.

- The allocation of facility costs between the existing community and the new development.
- Choice of the lifetime and interest rates to be used in annualizing costs of new plant.
- The timing of the new investment.

Cost Allocation

Capital expenditures associated with new development can be divided into two categories. First, facilities linked directly with the development, such as new schools, sewer lines, fire stations, and other new facilities to be utilized primarily by the new development. Costs of these facilities can be allocated largely or wholly to the new development. Second, facilities constructed or expanded as part of a capital improvement program which will be shared by existing as well as new residents or enterprises in the jurisdiction. Such facilties could include junior colleges, new sewage or water treatment plants, and health care centers. They are generally not triggered by a single development, unless it is very large.

The costs of the second category pose difficult, classic allocation questions involving consideration of scale economies and the optimum size and timing of new plant construction. The approaches are widely argued and a full discussion cannot be included here. Only a few suggestions must suffice.

If a new facility is part of a capital improvement plan and is initially underutilized in expectation of future growth, only the share of the total cost needed to meet the demands created by the new development should be allocated to it. For example, for a school the number of pupil-years of education required by the development as a percent of the total pupil-years provided by the school over its expected life could be used to allocate the annualized capital costs of the school to the development. This gives some of the benefit from the expected economy of scale to the new development. The balance of the annualized cost, until the facility is fully utilized, is shared by the total community. However, if earlier construction of the new facility is required because of the specific development, the analysis should take account of local funds requiring earlier outlay and the likely costs of construction at different times, including anticipated interest costs on bonds that would be borrowed by the local government for the project.[10]

If the new development uses available space in existing facilities, some would allocate only the short-term incremental cost, some the long-term incremental cost, and some the average cost. Which to use depends on the viewpoint and purpose of the analysis. The short-term incremental cost (which may be zero) reflects the out-of-pocket additional expense for the facility. The long-term incremental cost reflects the cost attributed to new development over the long run, including economies or diseconomies of scale they create. The average cost concept assumes each user bears an equal burden.

For either case—whether the new development uses old or new facilities—two separate capital expenditure computations might be made, one emphasizing causation of costs, the other what the community will have to spend. The first would indicate the relative burden on services from the new development, the second the changes in fiscal outlays that would be needed.

In some cases, a new development triggers a new capital investment that will be used by all of the community, and that will raise the per capita cost to the community for a service. An example is a tertiary sewage treatment plant required to keep water pollution below some limit. In most communities the practice is to distribute the cost of such facilties equally among all users. The cost for fiscal impact analysis purposes might be allocated to the entire community, but in some cases the costs might be allocated to the new develoment—it depends on the reasons for adding the plant and whether overall service quality improves or remains the same.

Facilities fully utilized prior to new development, such as public schools, should not be considered as part of the capital cost attributable to the new development.

10. In an inflationary economy, it is frequently advantageous to initiate construction in anticipation of future demands, since annual debt payments are fixed while the tax base is expanding.

Annualizing Costs

There are three means of paying for major capital projects: (1) general revenues from current tax receipts, (2) general obligation or revenue bonds, and (3) current revenue combined with general obligation or revenue bonds.[11]

Whether capital expenditures, which provide current as well as future benefits, should be paid from current revenues or over an extended time period, involves issues of equity, since the composition of the population using the capital improvements undergoes change during the useful life of the investment.[12] Most large communities—for both fiscal and political reasons—tend to borrow funds, particularly for school facilities.

The method of financing chosen by a jurisdiction influences the short-term and long-term costs of capital investment. In a slow-growing jurisdiction, a substantial portion of capital needs can be met from current revenues, on a "pay as you go" basis. Capital expenditures for such services as publicly owned utilities are usually self-financing from user charges through revenue bonds, and thus impose no direct burden on the public sector fiscal structure. However, major capital costs, for services not funded by user charges, particularly in areas of rapid growth, cannot be financed from current funds. Therefore, general obligation bonds are issued for a selected payback period.

The bond repayment periods selected by communities generally vary between 20 and 30 years. A suggested approach for determining per annum cost involves calculating the straight line amortization of capital over the useful life of the investment and adding the interest on the average balance outstanding. The interest rate selected when computing annualized capital expenditures should reflect the bond market at the time of the analysis. In 1973, interest rates for communities with a high bond rating fluctuated between 4.7 and 5.5 percent. (These percentages are considerably below the private market rate, since the interest on these bonds is not subject to federal income taxation.)

An alternative approach for computing the capital cost would be to estimate the useful economic life of the investment (excluding the value of the land), independent of the bond repayment period. Presumably, if the actual economic life could be estimated, the annual interest charges on a bond could be added to the amortized per annum economic life of the project. Thus, if bonds for a project had a 30-year repayment period, but the useful economic life of the project was 40 years, the annual capital costs could be reduced, although the difference would not be substantial. Technological and other changes may result in a shorter useful economic life for a capital investment than intially projected. In addition, elements of a particular project are likely to have differing economic life spans. As a result, basing estimates on the anticipated economic life of a project has practical limitations. Whatever method of annualization is used should be clearly stated, since it is often the basis for criticism in comparing fiscal flows.

Timing of Investment

Unless existing facilities are underutilized, increases in population or business enterprise expansion require immediate new public and private sector capital investment. The alternative would be a reduction in the level and quality of existing services, such as double school sessions, increased traffic congestion, or overcrowded recreational facilities.

In areas of rapid growth, public infrastructure investments frequently lag behind population increases because of public sector fiscal limitations, such as legal limits on borrowing; lag in revenues from new development; the initial diseconomies of scale (i.e., underutilization) associated with new facilities; or because of inadequate planning. As a result, there is often a short-term degradation in the provision of public services.

II. ADDITIONAL REFERENCES

It is recognized that the approach outlined in Part I of this Appendix A provides insufficient information, by itself, for undertaking a fiscal impact analysis. It is therefore suggested that the interested reader review one or more of the case studies and general methodologies briefly noted below for additional information on data sources, allocation methods, and computation procedures.

Only reports which focus on evaluation of individual developments are noted. Readers interested in methods for estimating communitywide growth effects or of determining the fiscal impact of alternative development patterns should refer to the Bibliography for references to reports on these subjects.

The Fiscal Impact of Residential and Commercial Development: A Case Study (1972)

This case study [5] applies the general methodology outlined in Part I of this appendix to a proposed mod-

11. Revenue bonds are those bonds secured with income received by a jurisdiction from the earnings of a revenue-producing enterprise, such as waterworks. General obligation bonds are secured by an unconditional pledge of a jurisdiction's credit, including its taxing power.

12. For a theoretical discussion of public debt issues, see R. A. Musgrave, *The Theory of Public Finance*, New York, McGraw Hill, 1959.

erate-scale PUD in a semi-rural county of Virginia. The report discusses allocation procedures for capital expenditures in considerable detail and an appendix focuses on estimating the fiscal impact of proposed developments on state government.

Population characteristics, particularly the number of school-age children, and household size by type of housing are estimated from a survey of similar developments in the community. Household size and income are among factors suggested to project service demand.

One limitation of the report is that since water and sewage services in the case study community are provided by an agency which is not part of the county government, the fiscal implications, if any, of new development on the cost of these services are not considered. The report does not discuss minor public services which some large urban communities may provide.

Municipal Cost-Revenue Analysis for Planned Unit Developments (1973)

This fiscal impact study [13] allocates costs and revenues associated with a moderate-scale PUD in Northern California, where multiple taxing districts complicate the evaluation process. Since early phases of the development were completed at the time the analysis was undertaken, household characteristics were obtained from an examination of mortgage applications and rental agreements, with tax data derived from assessment records. It is assumed that per capita expenditures for the new developments are the same as the community average. The study aims at an objective evaluation of revenues and costs associated with the development. However, the study has two significant limitations: capital expenditures are not included, thereby underestimating the overall public cost of new development; and some of the state funds are redistributed on a per capita basis, which differs from the actual distribution formulas.

Cost-Revenue Impact Analysis for Residential Developments (1974)

The approach of this report [2] is to utilize the 1970 Census of Population as the major data source on household characteristics. Estimates for public service demand are to be derived from local government department heads.

The report provides very detailed tables and schedules to be completed by those undertaking an analysis. Step by step guidelines accompany each table and schedule. A section of the report provides a methodology for estimating the level of commercial development likely to be attracted as a result of residential growth.

One limitation of this study is its reliance on the expected service demand based on the judgment of local personnel. The methodology is not applied to a specific development.

Computer-Assisted Approaches

A number of recent reports discuss computer-assisted procedures to implement cost-revenue analyses. These reports focus on the use of computers as aids in projecting costs and revenues by the use of standardized procedures and data formats.

A well-written, concise description of such a computer-assisted system is available [4]. However, the report provides only the most general guidance on how to obtain and allocate the necessary revenues and expenditures. Another computer-assisted model discusses cost curves for various categories of municipal services based on changing population levels [5]. Some guidelines for estimating service costs are given, but insufficient information is presented to undertake an analysis without reference to additional data sources.

Another computer-assisted approach to fiscal impact analyses is aimed at assessing the fiscal impact of publicly-financed housing developments in Michigan towns and cities [1]. It uses a model to develop five-year forecasts of the demographic, physical and economic characteristics of cities. These data are used to estimate costs and revenues linked to new public and private housing.

Computer-assisted approaches have the advantage of quickly calculating costs and revenues. However, none of the general models referenced incorporate all the major variables which influence revenues and expenditures within and among communities. The cost and complexity of developing and maintaining a more general model, applicable to most communities in the nation, are probably too great to be justified. The development of more sophisticated computer models, given the limitations of existing research, may in any case, be premature.

APPENDIX B. ATTENDEES, FISCAL COST-REVENUE ANALYSIS CONFERENCE, 1974

The study reflected in this report benefited considerably from the Conference on Fiscal Cost-Revenue Analysis, held at The Urban Institute in Washington, D.C. on January 23 and 24, 1974. The conference was cosponsored by HUD. The attendees opened many avenues of thought pursued in these pages, but responsibility for the content of the report remains solely with the author.

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